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BULLETIN
of the
American Association *of* Petroleum Geologists

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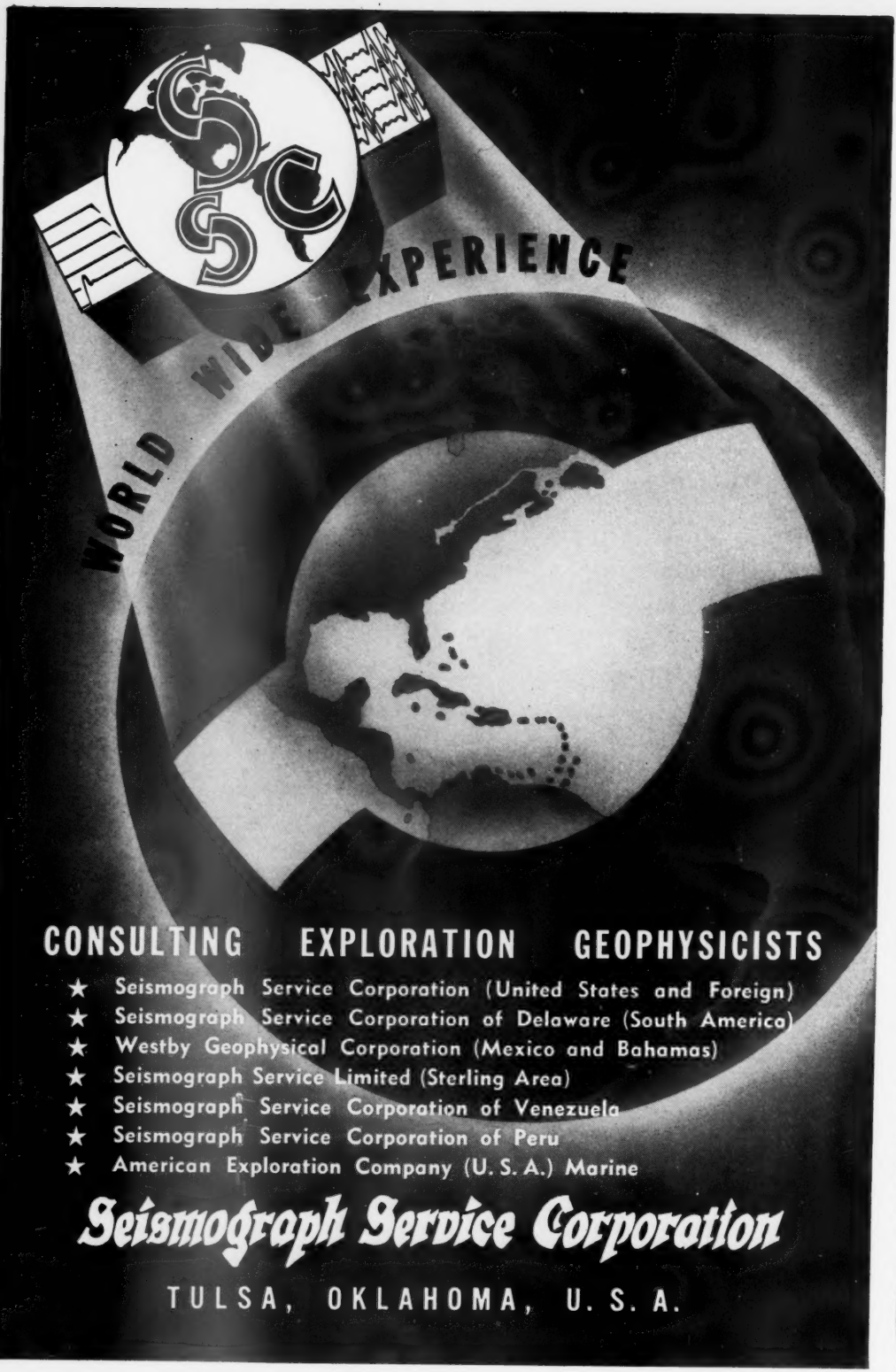
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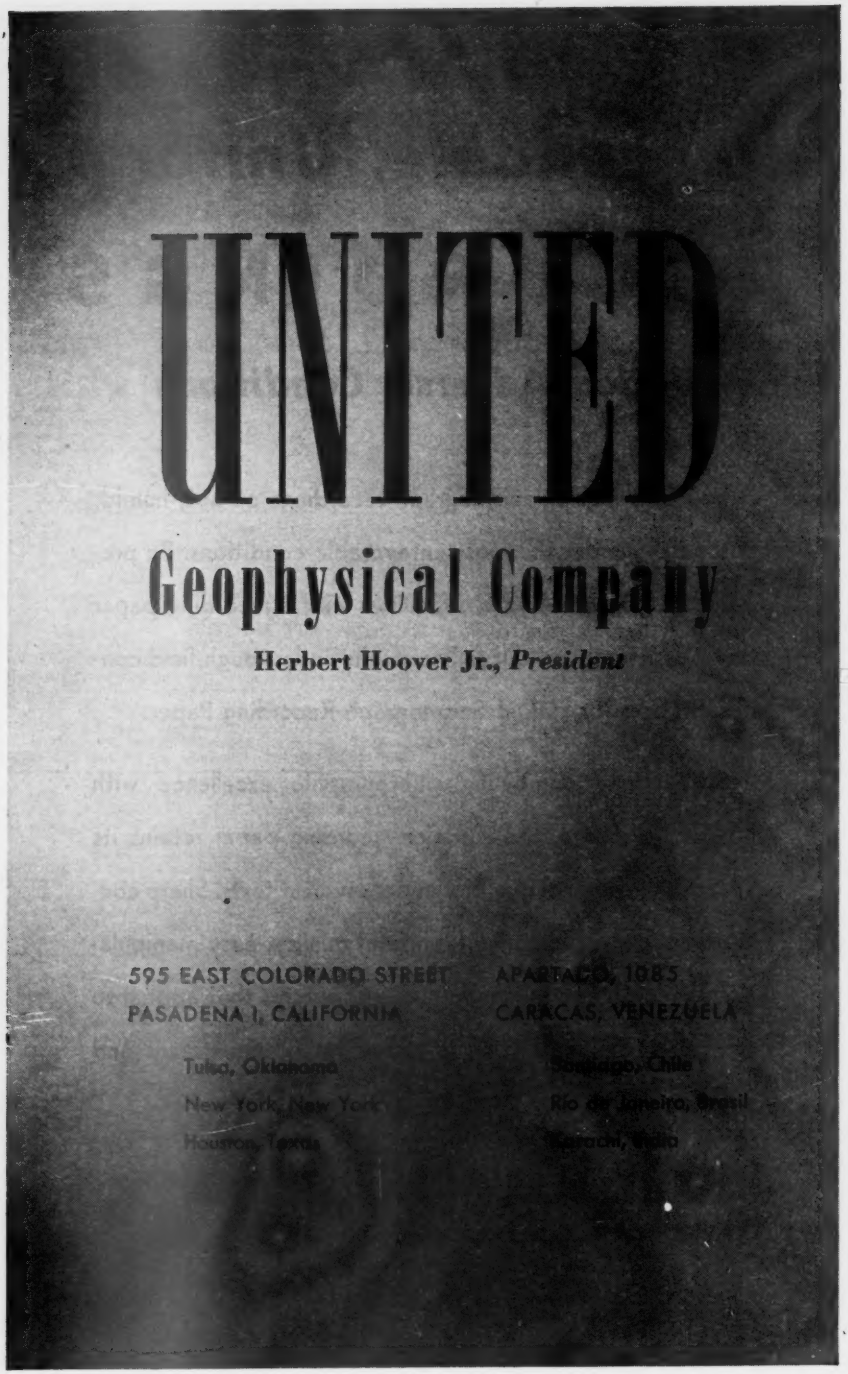
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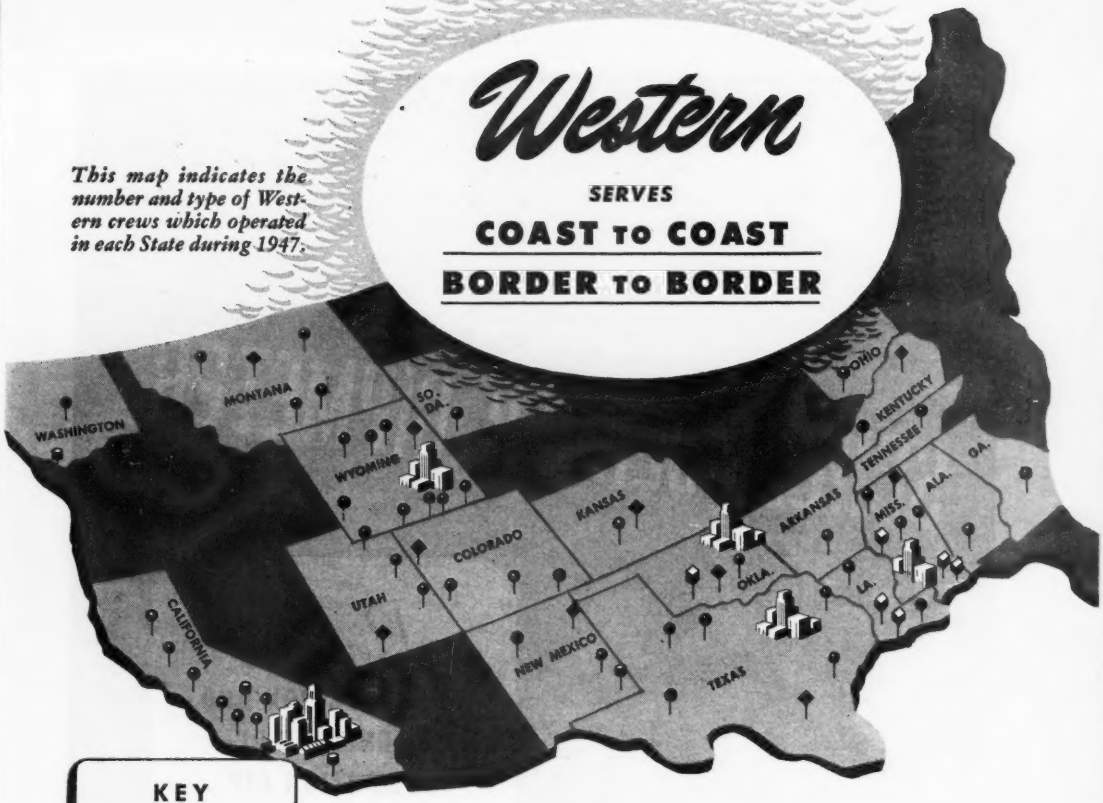

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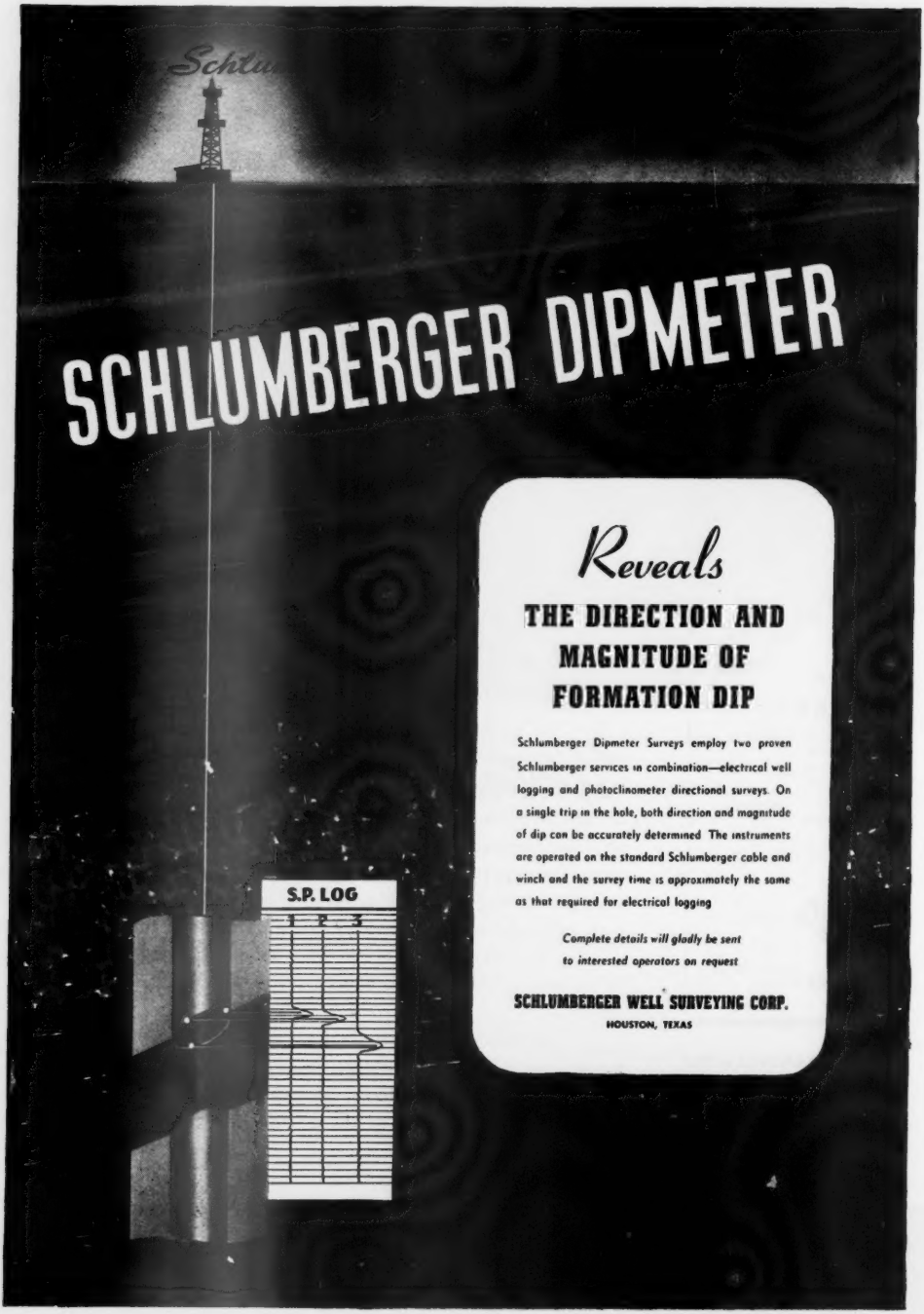
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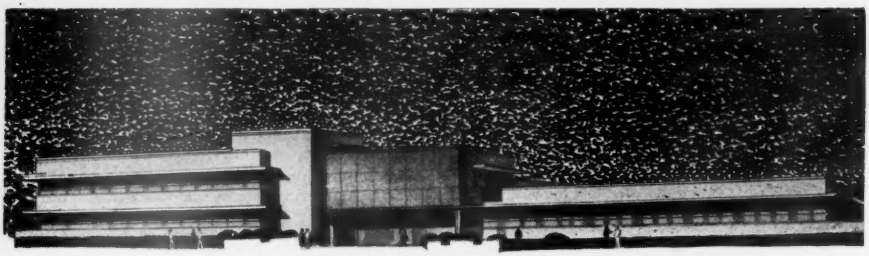

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EXPLORATORY DRILLING IN 1947[1]

FREDERIC H. LAHEE,[2] *Chairman*
Dallas, Texas

ABSTRACT

This is the third annual report on data gathered by the committee on statistics of exploratory drilling.

During 1947, 6,775 exploratory holes were drilled in the United States. Of these, 3,480 were new-field wildcats, 1,753 were new-pool tests (including new-pool wildcats, deeper-pool tests, and shallower pool tests), and 1,542 were outposts. Among the new-field wildcats, 394 were successful; among the new-pool tests, 495 were successful; and among the outposts, 489 were successful.

The total exploratory footage drilled in 1947 was 26,393,348 feet in the 6,775 holes, or 3,896 feet per hole. These figures compare with 22,178,864[3] feet drilled in 5,753[3] exploratory holes, with an average depth of 3,855 feet, in 1946.

This is the third annual report on data gathered and compiled by the committee on statistics of exploratory drilling. It is the eleventh article of its kind, written by the same author and printed each year in the June issue of this Association *Bulletin*. The articles for 1945 and earlier are listed on page 813 of the *Bulletin* for 1946. The report for 1946 was printed in June, 1947, on pages 917 to 930 of this *Bulletin*. Special attention is called to the "Review of Exploratory Drilling Statistics, 1938–1944," which appeared in the November issue of the *Bulletin* in 1945.[4]

To the members of the main committee, and also to the numerous persons who helped on subcommittees, the chairman is happy to express his thanks for their able assistance. Following is a list of the committee members and others who contributed to the work.

[1] Read before the Association at Denver, April 27, 1948. Manuscript received, March 12, 1948.

[2] Geological and research counselor, Sun Oil Company; chairman, committee on statistics of exploratory drilling.

[3] After publication of the 1946 report (*Bulletin*, June, 1947, pp. 917–30) a correction was made involving the addition of two new-field wildcats and subtraction of one deeper-pool test.

[4] Vol. 29, No. 11, pp. 1581–92.

Walter L. Ammon, assisted by L. C. Dennis, R. T. Drake, A. R. Edwards, L. L. Harden, Lloyd Haseltine, Chas. Ise, J. W. McDonald, R. L. McLaren, Glen Michel, John Moorhead, Neal Potts, H. A. Russell, J. J. Russell, and L. T. Teir
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C. W. Wilson, Jr., assisted by H. B. Burwell and M. C. Milhaus
R. M. Wilson, assisted by G. W. Burdick

In compiling the tables the writer was ably assisted by Jack Taylor, Sun Oil Company statistician.

Our committee has continued to use the classification of exploratory holes as outlined in Table I. All holes are grouped according to their preliminary classification (I), whether their original objective is attained, or not. Under this classification (I), the holes are then grouped according to their completion classification (II). It is to be noted that, while a majority of outposts, or, as we may also call them, "extension tests," if successful, are completed as extension wells, some discover new pools and therefore end as new-pool discovery wells. Similarly, any type of new-pool test, if successful, may sometimes end as an extension well rather than as a new-pool discovery well. These possibilities are indicated in parentheses under Col. B, 2a, 2b, and 3c, in Table I.

Definitions of the several types of exploratory hole are given on pages 631 to 634 of the summary for 1944.[5] Except where otherwise designated, the statistics recorded in the present report are similar to those used in our reports for 1939 and 1946, inclusive.

For the benefit of those who may not be thoroughly familiar with the basis of our classification, we repeat what was said last year.

All holes drilled below ground may be grouped as (1) those drilled for oil or gas, or (2) those drilled for other purposes. All holes drilled for oil or gas may be

[5] "Exploratory Drilling in 1944," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 29, No. 6 (June, 1945), pp. 620–45.

classed as (1) those which are *field-development wells*, located within or close to the developed part of an oil pool or gas pool (within the area of proved reserves), and drilled further to develop the pool or pools already partly developed; or (2) those which are *exploratory* in the sense that they are searching for new and as yet undiscovered pools or are searching for *long* extensions of pools already partly developed. We are here concerned only with the exploratory holes.

All exploratory holes are drilled either (1) on structures not yet producing, or (2) on structures already producing. Holes of the first of these two classes are

TABLE I

CLASSIFICATION OF EXPLORATORY WELLS

				I. *Classification When Drilling Is Started*	II. *Classification After Completion or Abandonment*	
					Successful	*Unsuccessful*
				A	*B*	*C*
Drilling for long extension of partly developed pool				1 Outpost (Extension test)	1 Extension well (Sometimes a new-pool discovery well)	1 Dry outpost (Dry extension test)
Drilling for a *new pool* on a structure or in a geological environment already productive	Drilling within limits of proved area of pool	For new pool *above* deepest pool		2a Shallower-pool test	New-pool discovery wells (Or sometimes extension wells): 2a Shallower-pool discovery well (Sometimes shallower-pool extension well)	Dry new-pool tests: 2a Dry shallower-pool test
		For new pool *below* deepest pool		2b Deeper-pool test	2b Deeper-pool discovery well (sometimes deeper-pool extension)	2b Dry deeper-pool test
	Drilling outside limits of proved of pool			2c New-pool wildcat	2c New pool discovery wildcat (Sometimes an extension well)	2c Dry new-pool wildcat
Drilling for a *new field* (on a structure or in an environment never before productive)				3 New-field wildcat	3 New-field discovery wildcat	3 Dry new-field wildcat

new-field wildcats. Occasionally, where structures are ill-defined and porosity varies considerably within relatively short distances, exploratory holes may be grouped here if they are 2 miles or more distant from the nearest production. Holes of the second class (on structures already producing) may be (1) *outside* the developed area (area of proved reserves), in which case they will be outposts or new-pool wildcats according to whether they are drilled to extend a partly developed pool (reservoir) or to explore for a new pool; or (2) *within* the "proved" developed area of the pool, in which case they may be deeper-pool tests (exploring *beneath* the deepest pool penetrated by the hole) or shallower-pool tests (exploring for a new pool *above* the deepest developed pool at the site of the well in question). There are very few holes that belong to this fifth class. Most of the wells of this

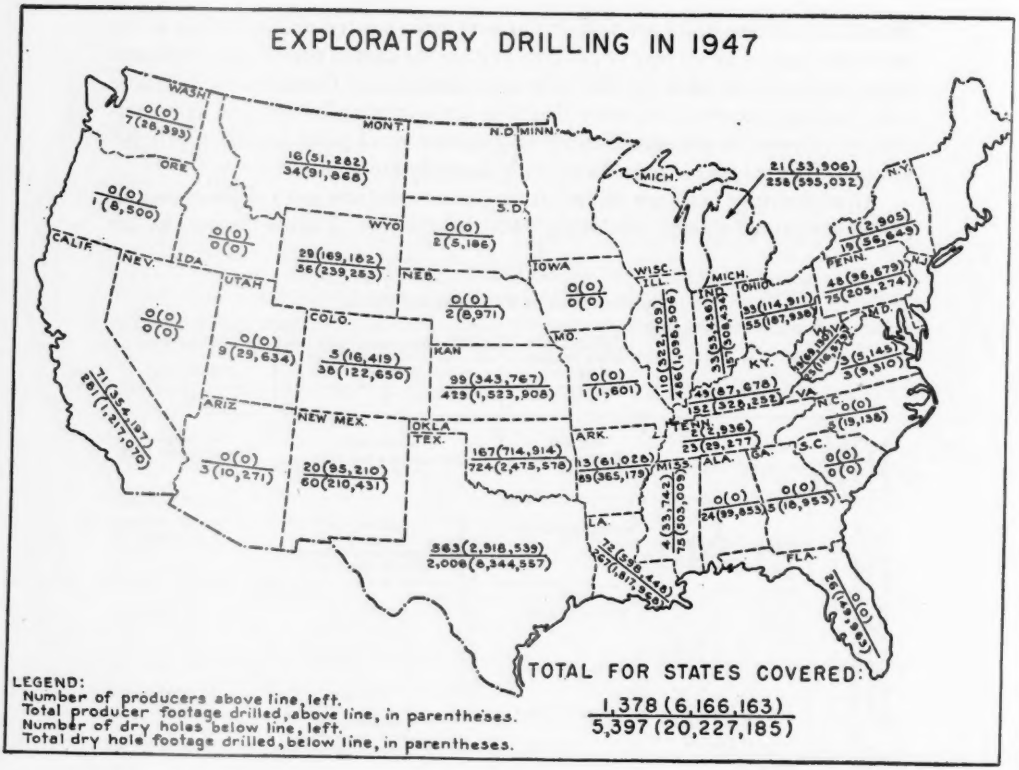
EXPLORATORY DRILLING IN 1947
WASH.
0(0)
7(28,393)
ORE.
0(0)
1(8,500)
CALIF.
0(0)
0(0)
NEV.
IDA.
0(0)
0(0)
MONT.
16(51,282)
34(91,868)
WYO.
29(169,182)
36(239,283)
UTAH
0(0)
9(29,634)
ARIZ.
0(0)
5(10,271)
COLO.
5(16,419)
38(122,650)
NEW MEX.
20(95,210)
60(210,431)
N.D.
0(0)
2(5,186)
S.D.
0(0)
2(6,971)
NEB.
99(343,767)
429(1,523,908)
KAN.
OKLA.
TEX.
167(714,914)
724(2,475,578)
563(2,918,539)
2,008(6,344,557)
MINN.
IOWA
0(0)
0(0)
MO.
0(0)
1(1,601)
ARK.
13(61,028)
89(365,179)
LA.
4(33,742)
75(503,009)
72(598,448)
267(1,817,968)
WISC.
ILL.
110(322,709)
286(1,096,506)
MICH.
21(53,906)
258(595,032)
IND.
33(85,458)
100(304,430)
OHIO
33(114,911)
155(187,930)
KY.
49(87,678)
152(329,232)
TENN.
2(2,936)
23(29,277)
MISS.
ALA.
0(0)
24(99,855)
GA.
0(0)
5(18,953)
FLA.
26(149,963)
0(0)
N.C.
0(0)
5(19,136)
S.C.
0(0)
0(0)
VA.
3(5,145)
3(9,310)
W.VA.
PENN.
2(2,905)
19(58,649)
N.Y.
48(96,679)
75(205,274)
MD.
N.J.
LEGEND:
Number of producers above line, left.
Total producer footage drilled, above line, in parentheses.
Number of dry holes below line, left.
Total dry hole footage drilled, below line, in parentheses.
TOTAL FOR STATES COVERED:
1,378(6,166,163)
5,397(20,227,185)

FIG. 1

SE NEW MEXICO
12(60,064)
44(163,302)
OKLAHOMA
ARKANSAS
13(61,028)
89(365,179)
LOUISIANA (NORTH)
22(127,813)
163(721,176)
LOUISIANA (SOUTH)
50(470,635)
104(1,096,792)
TOTAL LOUISIANA
72(598,448)
267(1,817,968)
MISSISSIPPI
4(33,742)
75(503,009)
ALABAMA
0(0)
24(99,853)
GEORGIA
0(0)
5(18,953)
SOUTH CAROLINA
0(0)
FLORIDA
26(149,963)
TEXAS
TOTAL TEXAS
563(2,918,539)
2,006(6,344,557)
TOTAL
664(3,671,821)
2 536(11,462,784)
ONE PRODUCER FOOT
FOR EVERY
3.12 FEET DRY
EXPLORATORY WELLS, 1947
① = TEXAS RAILROAD COMMISSION DISTRICTS

FIG. 2

kind are field-development wells that happen to find new shallower pools. In other words, such holes were not drilled for the purpose of *exploring* for a shallower reservoir. Only rarely is such exploration undertaken.

On the maps (Figs. 1 and 2), numbers in parentheses indicate total footage drilled; figures preceding parentheses indicate the number of holes drilled; figures above the cross line are for producing wells, that is, oil, oil and gas, condensate (distillate) and gas, and gas; and figures below the cross line are for dry holes.

In the states covered in this review, as shown in Figure 1, and listed in Table II, during 1947 a total of 26,393,348 feet was drilled in 6,775 exploratory holes, divided as follows.

	Feet
1,378 producers	6,166,163
5,397 dry holes	20,227,185

This means that 20.3 per cent of the holes drilled, and 22.9 per cent of the footage drilled, were successful in 1947. One producer foot was drilled for every 3.28 feet of dry hole. One successful well was drilled for every 3.90 dry holes. The average depth of hole was 3,896 feet.

In southern states district (Fig. 2), in 1946, a total of 15,134,605 feet was drilled in 3,200 holes, divided as follows.

	Feet
664 producers	3,671,821
2,536 dry holes	11,462,784

In this area, then, 20.8 per cent of the holes drilled, and 24.3 per cent of the footage drilled, were successful. One producer foot was drilled for every 3.12 feet of dry hole. One successful well was drilled for every 3.82 dry holes. The average depth of hole was 4,730 feet. For comparison with statistics for this same area in 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, and 1946, see Table III.

In Table IV are listed the reasons for drilling the exploratory holes in 1947, by using the best information available from men familiar with such statistics, each in his own state or district. According to these figures 1,301 exploratory holes drilled on technical advice (geology and/or geophysics) were successful, and 4,558 were dry; 31 holes, located for non-technical reasons, were producers, and 533 were dry; 46 producers and 306 dry holes were located for reasons unknown. These figures show that 22.2 per cent of the holes drilled on technical advice were producers as contrasted with 5.5 per cent successful in the case of the holes located without technical advice. Therefore, in 1947, locations based on technical recommendations were 4.0 times as successful as those drilled without such advice. With reference to new-field wildcats only, 200 producers and 1,691 dry holes were located mainly on geological bases; 101 producers and 516 dry holes were located on geophysics; 63 producers and 293 dry holes were located on geology plus geophysics; 15 producers and 380 dry holes were located on various non-technical bases; and 15 producers and 197 dry holes were located for reasons unknown. Either alone or in combination with geology, seismographic methods were

TABLE II

NUMBER OF OIL WELLS, GAS WELLS, CONDENSATE WELLS, AND DRY HOLES DRILLED AS EXPLORATORY TESTS IN 1947

States	Oil Producers		Gas Producers		Condensate Producers		Total Producers		Dry*		Grand Totals		Average Depth of Hole*
	Number of Holes	Footage	Number of Holes	Footage	Number of Holes	Footage	Number of Holes	Footage	Number of Holes	Footage	Number of Holes	Footage	
Alabama	0	0	0	0	0	0	0	0	24	99,853	24	99,853	
Arizona	0	0	0	0	0	0	0	0	3	10,271	3	10,271	
Arkansas	11	46,172	0	0	2	14,856	13	16,028	89	356,179	102	426,207	4,179
California	60	304,465	11	49,732	0	0	71	354,197	281	1,217,070	352	1,571,267	4,464
Colorado	3	11,925	2	4,494	0	0	5	16,419	38	122,650	43	139,069	3,234
Florida	0	0	0	0	0	0	0	0	26	140,963	26	140,963	5,768
Georgia	0	0	0	0	0	0	0	0	5	8,953	5	18,953	
Illinois	108	319,042	2	3,667	0	0	110	322,709	486	1,098,506	596	1,421,215	2,385
Indiana	30	51,687	3	1,749	0	0	33	53,436	157	308,434	190	361,870	1,905
Kansas	83	280,030	16	63,737	0	0	99	343,767	429	1,523,908	528	1,867,675	3,537
Kentucky	32	54,635	17	33,043	0	0	49	87,678	152	328,252	201	415,930	2,069
Louisiana	36	292,226	14	106,221	22	200,001	72	598,448	267	1,817,968	339	2,416,416	7,128
Michigan	16	44,352	5	9,554	0	0	21	53,906	258	595,032	279	648,938	2,326
Mississippi	4	33,742	0	0	0	0	4	33,742	75	503,009	79	536,751	6,794
Missouri	0	0	0	0	0	0	0	0	1	1,601	1	1,601	
Montana	8	30,355	8	20,927	0	0	16	51,282	34	91,868	50	143,150	2,863
Nebraska	0	0	0	0	0	0	0	0	2	8,971	2	8,971	
New Mexico	12	54,153	7	35,370	1	5,687	20	96,210	60	210,431	80	305,641	3,821
New York	0	0	1	2,905	0	0	1	2,905	19	56,649	20	59,554	
North Carolina	0	0	0	0	0	0	0	0	5	19,138	5	19,138	
Ohio	6	22,654	27	92,257	0	0	33	114,911	55	187,938	88	302,849	3,441
Oklahoma	129	573,344	35	112,590	3	28,980	167	714,914	724	2,475,578	891	3,190,492	3,581
Oregon	0	0	0	0	0	0	0	0	1	8,500	1	8,500	
Pennsylvania	6	9,907	42	86,772	0	0	48	96,679	75	205,274	123	301,953	2,455
South Dakota	0	0	0	0	0	0	0	0	2	5,186	2	5,186	
Tennessee	2	2,936	0	0	0	0	2	2,936	23	29,277	25	32,213	1,289
Texas	407	2,004,869	112	584,707	44	328,963	563	2,918,539	2,006	8,344,557	2,569	11,263,096	4,384
Utah	0	0	0	0	0	0	0	0	9	29,634	9	29,634	
Virginia	3	5,145	0	0	0	0	3	5,145	3	9,310	6	14,455	
Washington	0	0	0	0	0	0	0	0	7	28,303	7	28,303	
West Virginia	1	2,131	18	66,999	0	0	19	69,130	25	116,579	44	185,709	4,221
Wyoming	24	136,902	5	32,280	0	0	29	169,182	56	239,253	85	408,435	4,805
Totals	981	4,280,672	325	1,307,004	72	578,487	1,378	6,166,163	5,307	20,227,185	6,775	26,393,348	3,896

* Averages have been recorded here only for states where more than 25 exploratory holes were drilled in 1947.

TABLE III

COMPARATIVE STATISTICS FOR SOUTHERN STATES, SHOWN IN FIGURE 2*

Year	Producers Drilled				Dry Holes Drilled				Total Number Explor. Holes Drilled	Total Feet Drilled	Average Depth of Hole (Feet)	Number of Dry-Hole Feet Drilled for Each Producer Foot
	Holes		Footage		Holes		Footage					
	Number	Per Cent	Feet	Per Cent	Number	Per Cent	Feet	Per Cent				
1938	200	13.6	984,262	17.4	1,271	86.4	4,667,402	82.6	1,471	5,651,664	3,842	4.74
1939	161	12.6	779,345	14.8	1,113	87.4	4,501,559	85.2	1,274	5,281,014	4,145	5.90
1940	187	12.8	919,506	14.9†	1,279	87.2	5,251,273†	85.1	1,466	6,170,779	4,209†	5.71†
1941	258	16.5	1,264,774	18.4	1,305	83.5	5,578,975	81.6	1,563	6,843,749	4,372	4.41
1942	231	16.3	1,289,480	19.6	1,186	83.7	5,295,556	80.4	1,417	6,585,036	4,647	4.11
1943	287	17.3	1,546,956	18.8	1,369	82.7	6,680,512	81.2	1,656	8,227,468	4,968	4.32
1944	473	21.1	2,804,005	23.5	1,765	78.9	9,095,421	76.5	2,238	11,899,426	5,317	3.24
1945	613	22.7	3,508,301	26.1	2,093	77.3	9,944,302	73.9	2,706	13,452,603	4,971	2.83
1946	538	20.4	3,276,458	26.0	2,097	79.6	9,304,018	74.0	2,635	12,580,476	4,774	2.84
1947	664	20.8	3,671,821	24.3	2,536	79.2	11,462,784	75.7	3,200	15,134,605	4,730	3.12

* In this table, New Mexico data are for the southeastern part of the state only.
† See *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 25, p. 1938, where corrections are mentioned for these figures as they appeared in Table II, p. 1001, of the same volume.

responsible for 159 producers and 747 dry holes. Among new-field wildcats, 12 per cent of the holes drilled on technical advice were successful. These figures refer to totals for all the states reported (Fig. 1 and Table II).

For 10 years or more we have made a comparison like that given in the foregoing paragraph. It may be of interest to our readers to have a similar analysis for the 10-year period—1938 to 1947, inclusive. In these 10 years a total of 6,696 exploratory holes were successful and 26,235 were unsuccessful in the case of those

TABLE IV

BASIS FOR LOCATING EXPLORATORY HOLES DRILLED IN 1947

State	Geology		Geophysics*		Geology and Geophysics*		Sundry Non-Technical		Unknown		Totals		Grand Total
	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	
Alabama	0	5	0	12	0	1	0	4	0	2	0	24	24
Arizona	0	1	0	0	0	0	0	2	0	0	0	3	3
Arkansas	8	58	1	15	4	13	0	2	0	1	13	89	102
California	59	203	2	2	8	44	2	25	0	7	71	281	352
Colorado	5	27	0	1	0	6	0	1	0	3	5	38	43
Florida	0	7	0	15	0	0	0	4	0	0	0	26	26
Georgia	0	0	0	1	0	0	0	4	0	0	0	5	5
Illinois	104	421	0	3	6	32	0	25	0	5	110	486	596
Indiana	27	122	1	0	0	2	5	26	0	7	33	157	190
Kansas	83	291	10	26	1	16	5	95	0	1	99	492	528
Kentucky	45	117	1	0	0	0	1	22	2	13	49	152	201
Louisiana	31	129	25	81	16	56	0	1	0	0	72	267	339
Michigan	19	227	0	0	0	1	1	3	1	27	21	258	279
Mississippi	0	19	2	33	2	18	0	4	0	1	4	75	79
Missouri	0	0	0	0	0	0	0	0	0	1	0	1	1
Montana	10	23	2	1	4	2	0	4	0	4	16	34	50
Nebraska	0	0	0	1	0	0	0	1	0	0	0	2	2
New Mexico	17	26	2	3	0	0	0	4	1	27	20	60	80
New York	1	13	0	0	0	1	0	2	0	3	1	19	20
North Carolina	0	0	0	0	0	1	0	0	0	4	0	5	5
Ohio	7	17	10	0	0	0	3	8	13	30	33	55	88
Oklahoma	123	375	26	98	3	0	9	230	6	21	167	724	891
Oregon	0	0	0	0	0	1	0	0	0	0	0	1	1
Pennsylvania	32	39	0	0	0	0	2	10	14	26	48	75	123
South Dakota	0	2	0	0	0	0	0	0	0	0	0	2	2
Tennessee	0	10	0	0	0	0	0	0	2	13	2	23	25
Texas	397	1,348	76	303	82	202	3	48	5	105	563	2,006	2,569
Utah	0	5	0	2	0	0	0	2	0	0	0	9	9
Virginia	1	3	0	0	0	0	0	0	2	0	3	3	6
Washington	0	1	0	6	0	0	0	0	0	0	0	7	7
West Virginia	19	20	0	0	0	0	0	1	0	4	19	25	44
Wyoming	14	29	7	12	8	9	0	5	0	1	29	56	85
Totals	1,002	3,538	165	615	134	405	31	533	46	306	1,378	5,397	6,775

* Including geochemistry.

located on technical advice. Of those located on some non-technical basis, 388 were producers and 6,006 were dry. Therefore, among those located on technical advice, 20.33 per cent were successful, and among those located without such advice, 6.07 per cent were successful. For the whole period technically located holes were 3.34 times as successful as those drilled without technical advice.

Comparing last year's figures[6] with figures for 1947 we note the following.

1. In number of exploratory holes drilled there was an increase of 17.76 per

[6] F. H. Lahee, "Exploratory Drilling in 1946," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 31, No. 6 (June, 1947), pp. 917–30.

cent, and in exploratory footage drilled there was an increase of 19.06 per cent based on the 1946 figures. This was a remarkable increase in the exploratory effort.

2. Considering new-field wildcats ("rank" wildcats) only, 1947 witnessed an increase of 11.28 per cent in holes drilled and an increase of 16.67 per cent in footage drilled, compared with 1946.

3. In most of the states there was a marked increase in exploratory drilling in 1947, contrasted with 1946, but in a few states (Mississippi, New Mexico) the level remained nearly unchanged, and in Illinois, Montana, and Ohio, there was a marked decrease. In California there was a small decrease (4 per cent).

4. The average depth of hole for all exploratory drilling increased from 3,855 feet in 1946 to 3,896 feet in 1947. Most remarkable was the depth of drilling in southern Louisiana where 154 holes averaged 10,178 feet per hole.

As for several years past, again this year we shall refer to certain data pertaining to the group of seventeen states indicated in Figure 3 by diagonal northeast-southwest ruling. These seventeen states, each year from 1938 to 1947, inclusive, have included between 98 and 99 per cent of the proved oil reserves of the country. For this reason their study gives essentially a picture of conditions in the United States where we want to compare exploration activities and additions of new oil from year to year.

In Table V we present an analysis of the five classes of exploratory hole (Table I), and this is done both for the 17-states area and for the entire United States for 1946 and 1947. Last year we indicated that, in round numbers, exploratory drilling is roughly divisible into 54 per cent which is wildcatting for new fields, 23 per cent which is drilling for new pools on structures already producing, and 23 per cent which is outpost drilling for long-distance extensions of pools already partly developed. The corresponding percentages for 1947 exploratory drilling, for the United States as a whole, and again in round numbers, are 51 per cent, 26 per cent, and 23 per cent, respectively.

In 1947, in the 394 successful new-field wildcats throughout the United States, 2,086,864 feet were drilled, and 12,519,723 feet were drilled in the 3,086 dry new-field wildcats. Analogous figures, in 1946, were 1,692, 977 feet drilled in the 333 successful new-field wildcats of that year, and 10,818,985 feet drilled in the 2,792 dry new-field wildcats. These figures indicate that, in new-field wildcats in the country as a whole, the average depth was 4,004 feet in 1946 and 4,197 feet in 1947.

In the present report, for the first time, we are showing a complete breakdown, by the five classes of exploratory hole, for all such holes drilled in the United States. For the sake of comparison in previous years we are including not only a tabulation for 1947 (Table IX), but also similar analyses for 1944, 1945, and 1946 (Tables VI, VII, and VIII). In the future we hope to continue this series of tables.

In Tables X and XI are listed comparative data for the 17-states area, many of them similar to those presented for the United States in Tables II and IV, but

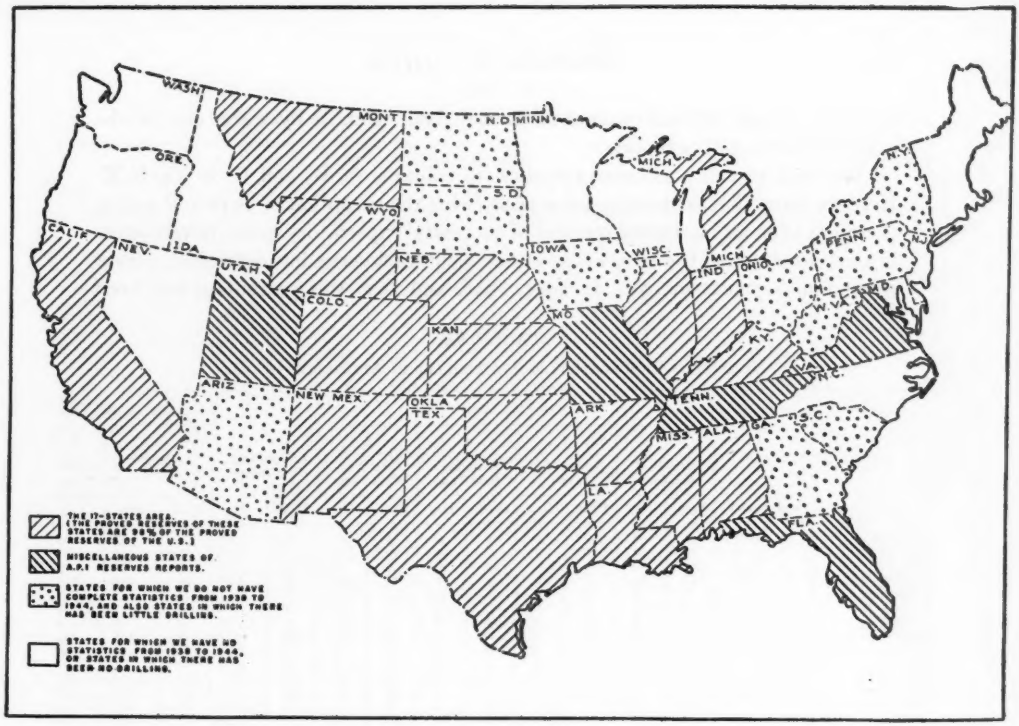

FIG. 3

TABLE V

DISTRIBUTION OF EXPLORATORY WELLS OF 1946 AND 1947 BY CLASSES AND RESULTS OF DRILLING

		17-States Area						*All States Reported*					
		*1946**			*1947*			*1946**			*1947*		
		Number	*Well Per Cent*	*Class Per Cent*	*Number*	*Well Per Cent*	*Class Per Cent*	*Number*	*Well Per Cent*	*Class Per Cent*	*Number*	*Well Per Cent*	*Class Per Cent*
Outposts	Producers	432	32.47		436	30.47		482	34.06		489	31.71	
	Dry holes	898	67.53		995	69.53		933	65.94		1,053	68.29	
	Totals	1,330	100.00	24.44	1,431	100.00	22.32	1,415	100.00	24.60	1,542	100.00	22.76
New-pool wildcats	Producers	175	24.30		296	26.15		213	26.39		324	26.64	
	Dry holes	545	75.70		836	73.85		579	73.11		892	73.36	
	Totals	720	100.00	13.23	1,132	100.00	17.66	792	100.00	13.77	1,216	100.00	17.95
Deeper-pool tests	Producers	80	21.62		137	28.25		85	21.79		145	29.06	
	Dry holes	290	78.38		348	71.75		305	78.21		354	70.95	
	Totals	370	100.00	6.80	485	100.00	7.57	390	100.00	6.78	499	100.00	7.37
Shallower-pool tests	Producers	21	80.77		25	67.57		24	82.76		26	68.42	
	Dry holes	5	19.23		12	32.43		5	17.24		12	31.58	
	Totals	26	100.00	.48	37	100.00	.58	29	100.00	.50	38	100.00	.56
New-field wildcats	Producers	313	10.45		378	11.37		333	10.65		394	11.32	
	Dry holes	2,682	89.55		2,947	88.63		2,794	89.35		3,086	88.68	
	Totals	2,995	100.00	55.05	3,325	100.00	51.87	3,127	100.00	54.35	3,480	100.00	51.36
Total producers		1,021	18.76		1,272	19.84		1,137	19.76		1,378	20.34	
Total dry holes		4,420	81.24		5,138	80.16		4,616	80.24		5,397	79.56	
Grand total		5,441	100.00	100.00	6,410	100.00	100.00	5,753	100.00	100.00	6,775	100.00	100.00

* A few corrections, with resulting percentage changes, have been made in 1946 figures since publication of exploratory drilling in 1946 (See *Bulletin*, June, 1947).

in Tables X and XI only annual totals are given. Details by states can be obtained from the earlier reports.

We wish to call particular attention to columns A, B, and C, in Table X. Here we show that, although, since 1940 (with the exception of 1942 and 1946), there has been an increasing number of successful exploratory holes, nevertheless in that same period the percentage of new-field discoveries has decreased, with a slight improvement in 1946. In 1945, 1946, and 1947 this percentage has been

TABLE VI

NUMBER OF EXPLORATORY HOLES DRILLED IN ALL STATES IN 1944

State	1 Outposts		New-Pool Tests								6 New-Field Wildcats		Total Exploratory Holes		
			2 New-Pool Wildcats		3 Deeper-Pool Tests		4 Shallower-Pool Tests		5 (2+3+4) Total New-Pool Tests				7 (1+5+6) Total		8 Grand Total
	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	
Alabama	0	1	1	0	0	0	0	0	1	0	2	20	3	21	24
Arizona	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Arkansas	0	1	0	0	0	8	0	0	0	8	3	63	3	72	75
California	31	26	17	54	8	16	0	0	25	70	15	148	71	244	315
Colorado	2	0	0	0	0	0	0	0	0	0	2	7	4	7	11
Florida	0	1	0	0	0	0	0	0	0	0	0	6	0	7	7
Georgia	0	0	0	0	0	0	0	0	0	0	0	6	0	6	6
Illinois	42	0	0	120	9	5	0	0	9	125	28	230	79	355	434
Indiana	1	2	6	0	0	2	0	0	6	2	7	73	14	77	91
Iowa	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Kansas	10	31	21	64	3	1	0	0	24	65	32	326	66	422	488
Kentucky*	5	10	9	1	1	0	0	0	10	1	15	151	30	162	192
Louisiana	7	6	37	43	4	11	2	1	43	55	19	108	69	169	238
Michigan	7	14	1	0	1	7	0	0	2	7	14	254	23	275	298
Mississippi	3	8	1	0	0	0	0	0	1	0	5	56	9	64	73
Missouri	0	0	0	0	0	0	0	0	0	0	0	5	0	5	5
Montana	0	9	1	0	1	0	0	0	2	0	5	35	7	44	51
Nebraska	0	0	0	0	0	0	0	0	0	0	0	16	0	16	16
New Mexico	4	7	3	1	0	0	0	0	3	1	2	57	9	65	74
New York	0	3	1	2	0	1	0	0	1	3	0	9	1	15	16
Ohio	15	29	7	16	3	9	1	2	11	27	8	21	34	77	111
Oklahoma	22	53	0	0	19	1	0	1	19	2	46	242	87	297	384
Pennsylvania	7	13	4	7	0	4	0	0	4	11	2	5	13	29	42
Tennessee	1	4	1	6	0	0	0	0	1	6	2	6	4	16	20
Texas	150	213	59	209	33	55	12	4	104	268	126	884	380	1,365	1,745
Utah	0	0	0	0	0	1	0	0	0	1	0	0	0	1	1
West Virginia	6	7	8	4	0	3	0	0	8	7	0	8	14	22	36
Wyoming	2	2	2	0	8	1	3	0	13	1	9	14	24	17	41
Total 17-States Area	286	383	158	492	87	107	17	6	261	605	330	2,684	878	3,672	4,550
Total Rest	29	57	21	35	3	18	1	2	25	55	12	68	66	180	246
Grand Total	315	440	179	527	90	125	18	8	287	660	342	2,752	944	3,852	4,796

* Statistics for Kentucky here refer to western Kentucky only.

less than half what it was in 1940. Significant also is the fact that, from 1939 to 1946, there has been apparent a general improvement, with some minor fluctuations, in the producer-dry-hole ratio from 8.71 dry holes per producer to 4.04[7] dry holes per producer, and from 6.80 feet drilled in dry holes per foot in producers to 3.29 feet drilled in dry holes per foot in producers. In other words exploratory drilling has been increasingly successful in finding new oil and gas—we are not

[7] In 1944 and 1945 this ratio was better than in 1946; that is, 4.18 and 3.78, respectively.

TABLE VII

NUMBER OF EXPLORATORY HOLES DRILLED IN ALL STATES IN 1945

State	1 Outposts		New-Pool Tests								6 New-Field Wildcats		Total Exploratory Holes		
			2 New-Pool Wildcats		3 Deeper-Pool Tests		4 Shallower-Pool Tests		5 (2+3+4) Total New-Pool Tests				7 (1+5+6) Total		8 Grand Total
	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	
Alabama	1	0	0	0	0	0	0	0	0	0	1	20	2	20	22
Arizona	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
Arkansas	0	2	0	0	0	1	0	0	0	1	3	44	3	47	50
California	40	51*	14	13	15	28	5	2	34	43	12*	230	86	324	410
Colorado	0	0	0	0	0	0	0	0	0	0	0	11	0	11	11
Florida	1	1	0	0	0	0	0	0	0	0	0	12	1	13	14
Georgia	0	0	0	0	0	0	0	0	0	0	0	6	0	6	6
Illinois	47	181	0	0	6	30	0	1	6	31	26	206	79	418	497
Indiana	0	0	3	0	2	1	1	0	6	1	21	87	27	88	115
Kansas	42	42	27	90	4	0	8	0	39	90	26	243	107	375	482
Kentucky	13	17	2	3	4	5	0	2	6	10	19	105	38	132	170
Louisiana	15	38	11	7	15	6	7	0	33	13	23	113	71	164	235
Maryland	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Michigan	6	41	3	26	1	5	4	0	8	31	19	251	33	323	356
Mississippi	5	5	1	1	2	2	0	0	3	3	6	107	14	115	129
Missouri	0	0	2	1	0	1	0	0	2	2	0	14	2	16	18
Montana	1	4	3	1	1	1	0	0	4	2	0	19	5	25	30
Nebraska	0	0	0	0	0	0	0	0	0	0	0	6	0	6	6
New Mexico	6	9	10	2	4	4	0	1	14	7	5	67	25	83	108
New York	2	5	1	6	0	0	0	0	1	6	0	6	3	17	20
Ohio	22	18	13	23	2	2	0	0	15	25	12	31	49	74	123
Oklahoma	30	49	43	174	2	0	0	0	45	174	19	120	94	343	437
Oregon	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Pennsylvania	17	13	10	22	6	10	1	0	17	32	1	13	35	58	93
Tennessee	0	0	0	0	0	0	0	0	0	0	0	6	0	6	6
Texas	213	245	90	294	45	209	7	1	142	504	146	919	501	1,668	2,169
Virginia	0	0	0	0	0	1	0	0	0	1	0	0	0	1	1
Washington	0	0	0	0	0	0	0	0	0	0	0	4	0	4	4
West Virginia	14	7	3	4	0	0	0	0	3	4	3	10	20	21	41
Wyoming	5	4	0	0	5	1	0	0	5	1	10	30	20	35	55
Total 17-States Area	424	688	207	611	106	293	32	7	345	911	336	2,578	1,105	4,177	5,282
Total Rest	56	44	29	56	8	14	1	0	38	70	16	107	110	221	331
Grand Total	480	732	236	667†	114	307	33	7	383	981	352	2,685	1,215	4,398	5,613

* California dry outposts were corrected from 52 to 51 after publication of article in 1945 exploratory drilling. Similarly, California successful NFW's were corrected from 11 to 12.

† There was a typographic error in this figure as printed in Table V, p. 822, *Bulletin*, June, 1946, and again in Table V, p. 925, *Bulletin*, June, 1947, where it appeared as 767. The totals were correct, however.

referring here to *quantity* of new oil and gas—in outpost drilling and in new-pool drilling, but it has been decreasingly successful in finding new oil and gas in new-field wildcat ("rank wildcat"[9]) drilling.

In Table XII are listed annual statistics comparing the American Petroleum Institute's figures on proved oil reserves[8] with our figures on exploratory drilling. This comparison is suggestive, but it is not quite precise, and for this reason: the estimated "new proved reserves" (columns C and E) include, for each year newly discovered proved reserves and also new proved reserves resulting from extensions of pools or fields previously discovered.[9] This new oil by extensions is

[8] We have taken totals of the reserves figures published by the A.P.I. each year for the 17 states. For December 31, 1946, we have used reserve figures analogous to those used in the earlier years. For 1947, we have used the A.P.I.'s figures for total liquid hydrocarbons, *i.e.*, crude oil plus natural-gas liquids.

[9] We need not concern ourselves here with revisions due to correction of factors used in making the reserve's estimates.

TABLE VIII

NUMBER OF EXPLORATORY HOLES DRILLED IN ALL STATES IN 1946

State	1 Outposts†		New-Pool Tests: 2 New-Pool Wildcats†		3 Deeper-Pool Tests		4 Shallower-Pool Tests		5 (2+3+4) Total New-Pool Tests		6 New-Field Wildcats		Total Exploratory Holes: 7 (1+5+6) Total		8 Grand Total
	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	
Alabama	0	0	0	0	0	0	0	0	0	0	0	9	0	9	9
Arizona	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
Arkansas	4	1	0	1	3	1	0	0	3	2	5	52	12	55	67
California	33	42	13	34	3	26	3	1	19	81	18	193	70	296	366
Colorado	0	0	0	0	0	3	0	0	0	3	1	16	1	19	20
Florida	0	0	0	0	0	0	0	0	0	0	0	16	0	16	16
Georgia	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
Illinois	58	256	0	0	10	37	0	2	10	39	31	288	99	583	682
Indiana	3	7	3	12	0	4	0	0	3	16	8	88	14	111	125
Kansas	45	57	18	71	2	0	8	0	28	71	17	207	90	335	425
Kentucky	11	18	5	3	1	6	0	0	6	9	12	100	29	127	156
Louisiana	14	19	11	41	9	8	1	0	21	49	26	156	61	224	285
Maryland	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Michigan	10	57	0	12	0	7	1	0	1	19	16	223	27	299	326
Mississippi	2	2	0	0	2	0	0	0	2	0	3	72	7	74	81
Missouri	0	0	0	0	0	0	0	0	0	0	0	6	0	6	6
Montana	10	21	2	8	2	3	0	0	4	11	4	15	18	47	65
Nebraska	0	0	0	0	0	0	0	0	0	0	0	5	0	5	5
Nevada	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
New Mexico	9	11	1	0	6	10	1	0	8	10	2	44	19	65	84
New York	1	0	0	1	0	0	0	0	0	1	0	14	1	15	16
Ohio	22	16	9	16	1	3	2	0	12	16	13	26	47	58	105
Oklahoma	18	118	50	94	2	7	1	0	53	101	45	257 (255)*	116	476 (474)*	592
Oregon	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
Pennsylvania	14	13	24	17	4	12	0	0	28	29	4	9	46	51	97
Tennessee	0	0	0	0	0	0	0	0	0	0	0	18	0	18	18
Texas	209	283	72	269	35	174 (175)*	6	2	113	445 (446)*	120	934	442	1,662 (1,663)*	2,104
Utah	0	0	0	0	0	0	0	0	0	0	0	8	0	8	8
Virginia	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1
Washington	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
West Virginia	13	5	5	3	0	0	1	0	6	3	3	5	22	13	35
Wyoming	6	6	0	0	5	4	0	0	5	4	5	23	16	33	49
Total 17-States Area	432	898	175	545	80	290 (291)*	21	5	276	840 (841)*	313	2,682 (2,680)*	1,021	4,420 (4,419)*	5,441
Total Rest	50	35	38	34	5	15	3	0	46	49	20	112	116	196	312
Grand total	482	933	213	579	85	305 (306)*	24	5	322	889 (890)*	333	2,794 (2,792)*	1,137	4,616 (4,615)*	5,753

* Since the foregoing data were printed, there have been two minor corrections. In Texas the number of dry deeper-pool tests was reduced from 175 to 174; and in Oklahoma 2 dry new-field wildcats were added to the 255 reported. These changes are included in the table with the incorrect previously published figures in parentheses.

† The figures for producing outposts and new-pool wildcats in this table do not agree with those published in Table V, p. 925, of this *Bulletin* for June, 1947, because 58 incorrectly designated new-pool wildcats were moved over to the outpost column, after the article was in print.

very largely a result of regular field development, not of exploratory drilling. In fact, some study of this matter leads us to conclude that probably not more than 2 per cent—certainly not more than 5 per cent—of the new proved reserves added by extensions in any given year is attributable to exploratory drilling. It is nearly all to be credited to field-development drilling. However, this "extension oil," each year, is really a follow-up of the discoveries of several preceding years. In this sense certain fractions of it might be credited to years gone by, but this would involve many serious difficulties. We believe that it is better to refer to the simpler picture as presented in Table XII, keeping in mind that

TABLE IX

NUMBER OF EXPLORATORY HOLES DRILLED IN ALL STATES IN 1947

State	1 Outposts		New-Pool Tests						6 New-Field Wildcats		Total Exploratory Holes		
			2 New-Pool Wildcats		3 Deeper-Pool Tests		4 Shallower-Tests		5 (2+3+4) Total New-Pool Tests				
											7 (1+5+6) Total		8 Grand Total
	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	
Alabama	0	0	0	0	0	0	0	0	0	0	0	24	0	24	24
Arizona	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
Arkansas	5	19	0	2	3	1	0	0	3	3	5	67	13	89	102
California	30	29	22	62	9	10	1	1	32	73	9	179	71	281	352
Colorado	2	3	0	0	0	0	0	0	0	0	3	35	5	38	43
Florida	0	1	0	0	0	0	0	0	0	0	0	25	0	26	26
Georgia	0	0	0	0	0	0	0	0	0	0	0	5	0	5	5
Illinois	63	214	6	31	13	46	0	1	19	78	28	194	110	486	596
Indiana	6	23	8	6	3	3	0	0	11	9	16	125	33	157	190
Kansas	28	71	56	216	0	0	3	0	59	216	12	142	99	429	528
Kentucky	12	8	12	14	5	4	0	1	17	19	20	125	49	152	201
Louisiana	11	55	25	28	6	4	3	0	34	32	27	180	72	267	339
Michigan	6	23	2	21	0	9	0	0	2	30	13	205	21	258	279
Mississippi	1	1	0	2	0	0	0	0	0	2	3	72	4	75	79
Missouri	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Montana	8	13	1	1	0	3	2	0	3	4	5	17	16	34	50
Nebraska	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
New Mexico	10	4	3	1	3	6	0	0	6	7	4	49	20	60	80
New York	0	2	0	4	0	0	0	0	0	4	1	13	1	19	20
North Carolina	0	0	0	0	0	0	0	0	0	0	0	5	0	5	5
Ohio	18	22	6	12	1	1	0	0	7	13	8	20	33	55	88
Oklahoma	44	170	69	208	7	11	8	6	84	225	39	329	167	724	891
Oregon	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Pennsylvania	24	23	14	35	7	2	0	0	21	37	3	15	48	75	123
South Dakota	0	0	0	0	0	1	0	0	0	1	0	1	0	2	2
Tennessee	0	0	0	0	0	0	0	0	0	0	2	23	2	23	25
Texas	195	343	92	244	83	248	7	3	182	495	186	1,168	563	2,006	2,569
Utah	0	0	0	0	0	1	0	0	0	1	0	8	0	9	9
Virginia	2	2	1	1	0	0	0	0	1	1	0	0	3	3	6
Washington	0	0	0	0	0	0	0	0	0	0	0	7	0	7	7
West Virginia	9	8	7	4	0	1	1	0	8	5	2	12	19	25	44
Wyoming	15	19	0	0	5	3	1	0	6	3	8	34	29	56	85
Total 17-States Area	436	995	296	836	137	348	25	12	458	1,196	378	2,947	1,272	5,138	6,410
Total Other States	53	58	28	56	8	6	1	0	37	62	16	139	106	259	365
Grand Total	489	1053	324	892	145	354	26	12	495	1,258	394	3,086	1,378	5,397	6,775

columns G and I do not actually measure the results of the exploratory effort for any given year. If a somewhat closer analysis is sought, an approach to the problem can be made similar to that illustrated in Table V, on page 1589 of our "Review."[10]

As indicated in Table I, a hole may be located as an outpost with the intention of trying to extend a pool partly developed, but instead it may discover a new pool; and, similarly, a new-pool wildcat may be located in search of a new pool because it is believed to be well outside the limits of the known pool, but instead it may result in extending this known pool farther than had been expected. A majority of outposts, if successful, are completed as extension wells and a majority of new-pool wildcats, if successful, discover new pools. To show the class distribution of these completions in 1947, we prepared Table XIII. Here we see that 431 outposts were completed as extension wells and 58 were completed as new-

[10] "Review of Exploratory Drilling Statistics, 1938–1944," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 29, No. 11 (November, 1945), pp. 1581–92.

TABLE X

STATISTICS ON EXPLORATORY HOLES AND FOOTAGE DRILLED, AND ON AVERAGE DEPTH OF EXPLORATORY HOLE, IN 17-STATE AREA

	A		B	C	D	E	F	G	H	I	J	K
Year	Successful Exploratory Wells				Number of Dry Exploratory Holes	Total Exploratory Holes (A+D)	Number of Dry Exploratory Holes Drilled for Each Producer (D/A)	Total Footage in Successful Exploratory Holes	Total Footage in Dry Exploratory Holes	Number of Feet Drilled in Dry Holes for Each Foot in Producers (H/G)	Total Exploratory Footage (G+H)	Average Depth of Exploratory Hole (J/E)
	Total Number of Producers*		New-Field Discovery Wells	B is What Per Cent of A								
1938	294 oil, 75 gas	369	226	61.2	2,264	2,633	6.13	1,526,557	7,303,609	4.78	8,830,166	3,354
1939	226 oil, 49 gas	275	175	63.6	2,396	2,671	8.71	1,118,420	7,610,632	6.80	8,729,052	3,268
1940	229 oil, 64 gas	363	238	65.5	2,618	2,981	7.21	1,419,875	8,635,624	6.08	10,055,499	3,373
1941	416 oil, 86 gas	502	281	55.9	2,716	3,218	5.41	2,045,769	9,488,962	4.63	11,534,731	3,584
1942	408 oil, 82 gas	490	263	53.6	2,690	3,180	5.48	2,155,522	9,894,844	4.59	12,050,366	3,789
1943	526 oil, 118 gas	644	288	44.7	3,144	3,788	4.88	2,714,855	12,235,454	4.51	14,950,309	3,947
1944	697 oil, 181 gas	878	330	37.6	3,672	4,550	4.18	4,190,732	15,228,020	3.63	19,418,752	4,268
1945	826 oil, 278 gas	1,104	335	30.3	4,178	5,282	3.78	5,159,145	16,803,881	3.56	21,963,026	4,007
1946	742 oil, 279 gas	1,021	313	30.7	4,419	5,440	4.33	4,915,572	16,247,991	3.31	21,163,563	3,890
1947	963 oil, 309 gas	1,272	378	29.7	5,138	6,410	4.04	5,874,457	19,350,519	3.29	25,224,976	3,935

* In this Column "gas" includes both gas wells and gas plus condensate wells.

TABLE XI

SUMMARY OF STATISTICS ON BASIS FOR LOCATING EXPLORATORY HOLES IN 17-STATES AREA

Year	Geology		Geophysics		Geology and Geophysics		Sundry Non-Technical		Unknown		Totals		Grand Total
	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	
1938	192	1,039	78	251	31	67	44	535	24	372	369	2,264	2,633
1939	140	1,100	69	393	13	40	43	662	10	201	275	2,396	2,671
1940	195	1,195	100	443	22	79	35	770	11	131	363	2,618	2,981
1941	300	1,357	143	432	28	111	29	755	2	61	502	2,716	3,218
1942	305	1,418	110	484	42	134	22	575	11	79	490	2,690	3,180
1943	405	1,813	147	538	65	242	21	480	6	71	644	3,144	3,788
1944	568	2,014	145	643	102	263	58	672	5	80	878	3,672	4,550
1945	771	2,733	142	543	140	313	29	353	22	236	1,104	4,178	5,282
1946	691	2,982	142	459	158	311	16	452	14	215	1,021	4,419	5,440
1947	942	3,420	155	591	134	402	26	500	15	225	1,272	5,138	6,410

TABLE XII

SUMMARY OF STATISTICS ON PROVED OIL RESERVES AND EXPLORATORY DRILLING IN 17-STATES AREA

Year	A Proved Oil Reserves as of Jan. 1 (1,000's of (Bbls.)	B Proved Oil Reserves as of Dec. 31† (1,000's of Bbls.)	C Net New Proved Oil Reserves (1,000's of Bbls.)	D Oil Production During Year (1,000's of Bbls.)	E Gross New Proved Oil Reserves (C+D) (1,000's of Bbls.)	F Total Exploratory Footage (Feet)	G New Proved Oil Reserves (E) Per Exploratory Foot Drilled (Bbls.) E/F	H Total Number of Exploratory Holes Drilled	I New Proved Oil Reserves (E) Per Exploratory Hole Drilled (Bbls.) E/H
1938	15,102,239	17,056,370	1,954,131	1,183,733	3,137,864	8,830,166	355.3	2,633	1,191,744
1939	17,056,370	18,186,767	1,130,397	1,235,013	2,365,410	8,729,052	270.9	2,671	885,589
1940	18,186,767	18,688,777	502,010	1,322,794	1,824,804	10,055,499	181.5	2,981	612,161
1941	18,688,777	19,270,869	582,092	1,375,411	1,957,503	11,534,731	169.7	3,218	608,298
1942	19,270,869	19,792,818	521,949	1,355,102	1,877,051	12,050,366	155.7	3,180	590,267
1943	19,792,818	19,759,516	−33,302	1,475,881	1,442,579	14,950,309	96.5	3,788	380,828
1944	19,759,516	20,171,588	412,072	1,653,453	2,065,525	19,418,752	106.0	4,550	453,961
1945	20,171,588	20,566,405	304,817	1,713,725	2,108,542	21,963,025	96.0	5,282	399,194
1946	20,566,405	21,682,344	1,115,939	1,701,952	2,817,891	21,163,563	133.1	5,440	517,994
	Proved Liquid Hydrocarbon Reserves as of Jan. 1 (1,000's of Bbls.)*	*Proved Liquid Hydrocarbon Reserves as of Dec. 31† (1,000's of Bbls.)*	*Net New Proved Liquid Hydrocarbon Reserves Found During Year (1,000's of Bbls.)*	*Liquid Hydrocarbon Production During Year (1,000's of Bbls.)*	*Proved Gross New Liquid Hydrocarbon Reserves (C+D) (1,000's of Bbls.)*	*Total Exploratory Footage Drilled During Year (Feet)*	*New Proved Liquid Hydrocarbon Reserves (E) Per Exploratory Foot Drilled (Bbls.) E/F*	*Total Number of Exploratory Holes Drilled During Year*	*New Proved Liquid Hydrocarbon Reserves (E) Per Exploratory Hole Drilled (Bbls.) E/H*
1947	23,723,140	24,457,639	734,499	1,983,102	2,717,601	25,224,976	207.7	6,410	423,962

* The proved oil reserves shown in this table, from 1938 to 1946, inclusive, are comparable in the sense that they include crude oil and cycle-plant condensate with some lease condensate. This statement applies to 1946 where figures analogous to those preceding have been used, although the Report of the American Petroleum Institute for December 31, 1946, has been prepared on a different basis. For 1947 the figures refer to crude oil plus natural gas liquids, and are listed as "liquid hydrocarbons." Unfortunately we have no figures for 1947 exactly comparable with 1946 and earlier.

† This figure happens to be between 98 and 99 per cent of the total proved oil reserves of the United States as of the same date (December 31) each year.

TABLE XIII

NEW-POOL DISCOVERIES AND EXTENSIONS OF OLDER POOLS IN 1947

		New Pools Discovered				*Total New Pools Discovered in 1947*	*Extension of Old Pools*		*Total Extensions*
		By Outposts	*By New-Pool Wildcats*	*By Deeper-Pool Tests*	*By Shallower-Pool Tests*		*By Outposts*	*By New-Pool Wildcats*	
A 17-States area	Oil	35	200	104	18	357	308	27	335
	Gas	14	45	20	7	86	58	10	68
	Condensate	8	12	13	0	33	13	2	15
B Remaining states	Oil	0	4	1	0	5	10	0	10
	Gas	1	23	7	1	32	42	1	43
	Condensate	0	0	0	0	0	0	0	0
C Total U. S. (A+B)	Oil	35	204	105	18	362	318	27	345
	Gas	15	68	27	8	118	100	11	111
	Condensate	8	12	13	0	33	13	2	15
Grand total (Oil+gas+condensate)		58	284	145	26	513	431	40	471

TABLE XIV

NUMBER OF FIELDS DISCOVERED EACH YEAR, FROM 1938 TO 1946, INCLUSIVE, IN 17-STATES AREA, GROUPED ACCORDING TO TOTAL ULTIMATE RESERVES AS ESTIMATED ON DECEMBER 31, 1947

Year of Discovery	*Reserves Groups**							*Total A–F, Incl.*	*A+B+C Fields*	*Percentage of A+B+C Fields in Total Fields*
	A	*B*	*C*	*D*	*E*	*F*	*Gas*			
	Number of Fields Discovered in Year Indicated									
1938	12	8	20	57	94	33	10	224	40	17.8
1939	5	2	16	49	70	26	10	168	23	13.7
1940	5	10	19	53	121	20	15	228	34	14.9
1941	5	2	15	68	154	26	24	270	22	8.1
1942	1	3	13	55	153	30	19	255	17	6.7
1943	2	3	11	62	184	19	31	281	16	5.7
1944	4	1	9	65	152	16		247	14	5.7
1945	1	1	9	49	183	17	45	260	11	4.2
1946	0	1	5	39	205	7	41	257	6	2.3

* In these estimates of total ultimate reserves, made as of December 31, 1947 (January 1, 1948),
A: 50 million or more barrels.
B: between 25 million and 50 million barrels.
C: between 10 million and 25 million barrels.
D: between 1 million and 10 million barrels.
E: less than 1 million barrels.
F: abandoned.

pool discoveries; and 284 new-pool wildcats discovered new pools whereas 40 new-pool wildcats were completed as extension wells. It is further interesting to note, referring to both Tables V and XIII, that in the 17-states area, in 1947, 378 new fields and 457 new pools were discovered, as compared with 418 extensions, and that in the entire country there were 394 new-field discoveries and 513 new-pool discoveries, compared with 471 extensions.[11]

A question sometimes asked concerns the approximate percentage of true wildcatting (new-field wildcatting) by major companies, on the one hand, and by

[11] The new-pool discoveries referred to in this paper are all the result of exploratory drilling. In addition to these, at least 67 new pools were discovered in the drilling of field-development wells. These included 2 discoveries of gas and 65 of oil.

minor companies and independents, on the other hand. Distinction between these three classes of operator is not always easy, and in some instances the same company may be regarded as a "major" in one district, but as a "minor" in another district. Consequently we left the classification to the judgment of the various committeemen, each for his own district. Usually a major company is defined as one which is integrated with respect to at least three of the four main branches of production, transporation, refining, and marketing.

Our statistics showed that in the country as a whole, 781 new-field wildcats (134 producers and 647 dry holes) were drilled by majors; 2,311 new-field wildcats (225 producers and 2,086 dry holes) were drilled by minors and independents; and 387 new-field wildcats (35 producers and 352 dry holes) were drilled by minors or independents with the drilling financed by major companies. Corresponding figures for the 17-states area were 711 new-field wildcats (126 producers and 585 dry holes) by majors; 2,234 new-field wildcats (217 producers and 2,017 dry holes) by minors and independents; and 380 new-field wildcats (35 producers and 345 dry holes) by minors and independents with the drilling financed by majors.

In our "Review of Exploratory Drilling Statistics," already cited, on pages 1590 and 1591, and in Table VI of that article, we compared estimates of total ultimate reserves of the fields discovered in the 17-states area in the years 1938 to 1943, inclusive, these *estimates* being made, not at the time of discovery, but all of them as of January 1, 1945. Since the fields in 1943 were the latest considered in that study, all of them had at least a year of development history on January 1, 1945, to help toward a reasonably fair estimate. The older fields had a correspondingly longer period of development history to serve as a guide. In making the estimates the reserves of pools subsequently discovered on a producing structure were all added to the reserves of the first pool discovered on that structure, and the total of these pool reserves was assigned to the year of discovery of the first pool. No fields were included in the study except those of which the first pool was discovered within the 6-year period (1938–1943).

In accordance with our suggestion made in the "Review," our committee has made a re-appraisal of the fields discovered in those six years in the 17-states area, and has added estimates of the total ultimate reserves for the new-field discoveries of 1944, 1945, and 1946, in the same area. Table XIV presents these estimates which were made as of January 1, 1948. As a result of the re-appraisal several fields were dropped from the list either because they were gas fields or because they were abandoned. A few gas fields which began to produce oil were added to the list. Those fields which have been abandoned are designated "F." Fields with total ultimate reserves of 50 million barrels, or more, are designated "A"; those with total ultimate reserves of between 25 and 50 million barrels are called "B"; between 10 million and 25 million barrels, "C"; between 1 million and 10 million barrels, "D"; and with less than 1 million barrels, "E." These figures all refer to the reserves estimated to have been originally present in the field before any oil was produced.

In the re-appraisal of January 1, 1948, 4 B-fields were raised to "A"; 1 B-field was lowered; 5 C-fields were raised; 2 C-fields were lowered; 17 D-fields were raised; 9 D-fields were lowered; 64 E-fields were raised; and 51 E-fields were lowered, *i.e.*, abandoned. In all, then, in 90 fields the rating was raised, and in 63 it was lowered, and 51 of these 63 were abandonments. Most of the raises come in the "D's" and "E's" which are fields in which the reserves have been too conservatively estimated or fields in which new pools have been discovered since the earlier ratings were applied. Very few C-fields and B-fields are raised. If we add together the A-fields, B-fields, and C-fields for each year, that is, all fields having total ultimate reserves of 10 million barrels or more, and find the percentage of these totals in the whole group of fields (A to E inclusive) for each year, we observe a regularly decreasing percentage (see last column in Table XIV). Comparing these percentages with those recorded in the corresponding column in Table X of last year's report,[12] the reader will note a moderate increase in certain years, especially in 1945; but the general downward trend from 1938 to 1946 is hardly altered by these changes.

[12] *Bull. Amer. Assoc. Petrol. Geol.* (June, 1947), p. 930.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
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DEVELOPMENTS IN CALIFORNIA IN 1947[1]

GRAHAM B. MOODY[2]
San Francisco, California

ABSTRACT

Total exploratory footage in 352 exploratory wells completed in 1947 was 1,571,257 (298 miles). Comparable figures for 1946: 366 wells and 1,584,647 feet. Total number of completions, total footage, and percentage of success for the different types of exploratory wells were as follows: new-field wildcats—188 wells, 787,256 feet, wells 4.8 per cent successful, footage 5.9 per cent successful; new-pool wildcats—84 wells, 403,697 feet, wells 26.2 per cent successful, footage 20.1 per cent successful; deeper-pool tests—19 wells, 62,248 feet, wells 47.4 per cent successful, footage 33.1 per cent successful; shallower-pool tests—2 wells, 7,316 feet, wells 50 per cent successful, footage 71.2 per cent successful; outposts—59 wells, 310,740 feet, wells 50.8 per cent successful, footage 49.2 per cent successful. All exploratory wells were 20.2 per cent successful as to number and 19.5 per cent successful as to footage; analogous figures for 1946 were 19.1 per cent and 19.4 per cent, respectively. The number of new fields and new pools discovered was 35 oil and 6 gas, but none of these can be rated yet as a major discovery. Preliminary estimates indicate that new fields, new pools, and successful extensions added 138,000,000 barrels to oil reserves and 178,000,000 MCF to gas reserves. Production in 1947 was about 336,598,000 barrels (including condensate) and about 583,600,000 MCF of gas; analogous figures for 1946 were 317,482,000 barrels and about 532,454,000 MCF. Basement was reached by 47 unsuccessful exploratory wells that varied in total depth from 416 to 8,232 feet. There were 60 exploratory wells active at the close of 1947.

INTRODUCTION

California drilling wells are classified by a committee of seven men who are actively engaged in following exploratory work. The members of this committee for 1947 were: F. B. Carter, T. J. Fitzgerald, H. W. Lee, H. E. Rader, R. L. Rist, A. J. Solari, and the writer as chairman. The committee meets at intervals throughout the year and reaches agreement on such matters as classification of wells and basis for locating wells and checks all factual data for accuracy. The members of this committee work so efficiently that they leave the chairman little to do except to enjoy their discussions, reassemble their figures in tabular form, and add a few descriptive words in preparing this article.

F. H. Lahee's[3] classification of exploratory wells is followed. The members of the California committee use for each exploratory well a letter-size sheet designed so that pertinent data on any type of exploratory well can be entered at intervals as the well is drilled. Figure 5 shows the front of this sheet; the back of the sheet is lined in conformity with the bottom half of the front.

EXPLORATION

The locations of exploratory wells relative to previously producing areas are shown in Figures 1, 2, 2-A, and 2-B. The last two are enlargements of the most

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, March 13, 1948.

[2] Standard Oil Company of California. The writer expresses his thanks to M. E. Bigelow for assistance in compilation of the tables and to D. J. Christensen, A. A. Hagen, and J. H. Harvey for preparing the figures for publication.

[3] Frederic H. Lahee, "Exploratory Drilling in 1944," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 29, No. 6 (June, 1945), p. 630.

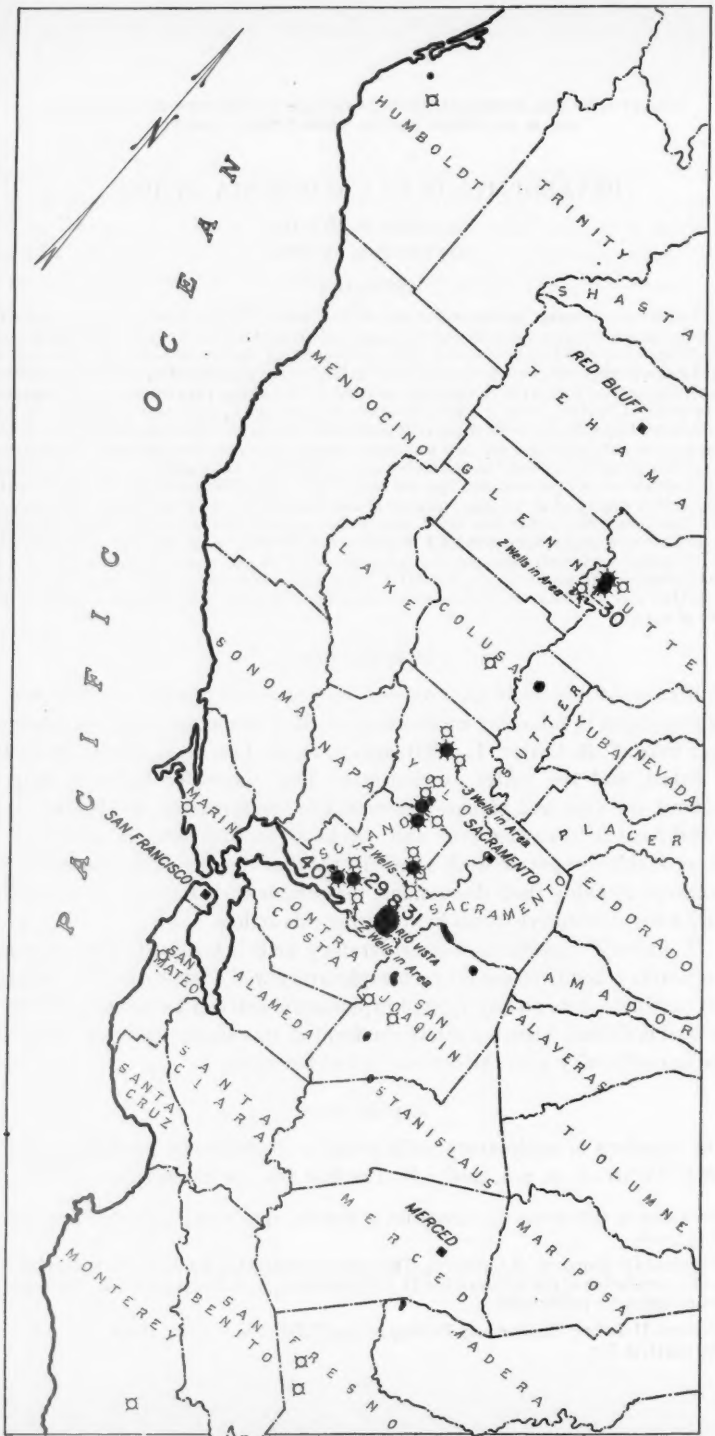


FIG. 1.—Locations of 1947 exploratory wells in north half of California.
See Figure 2-A for explanation of symbols.

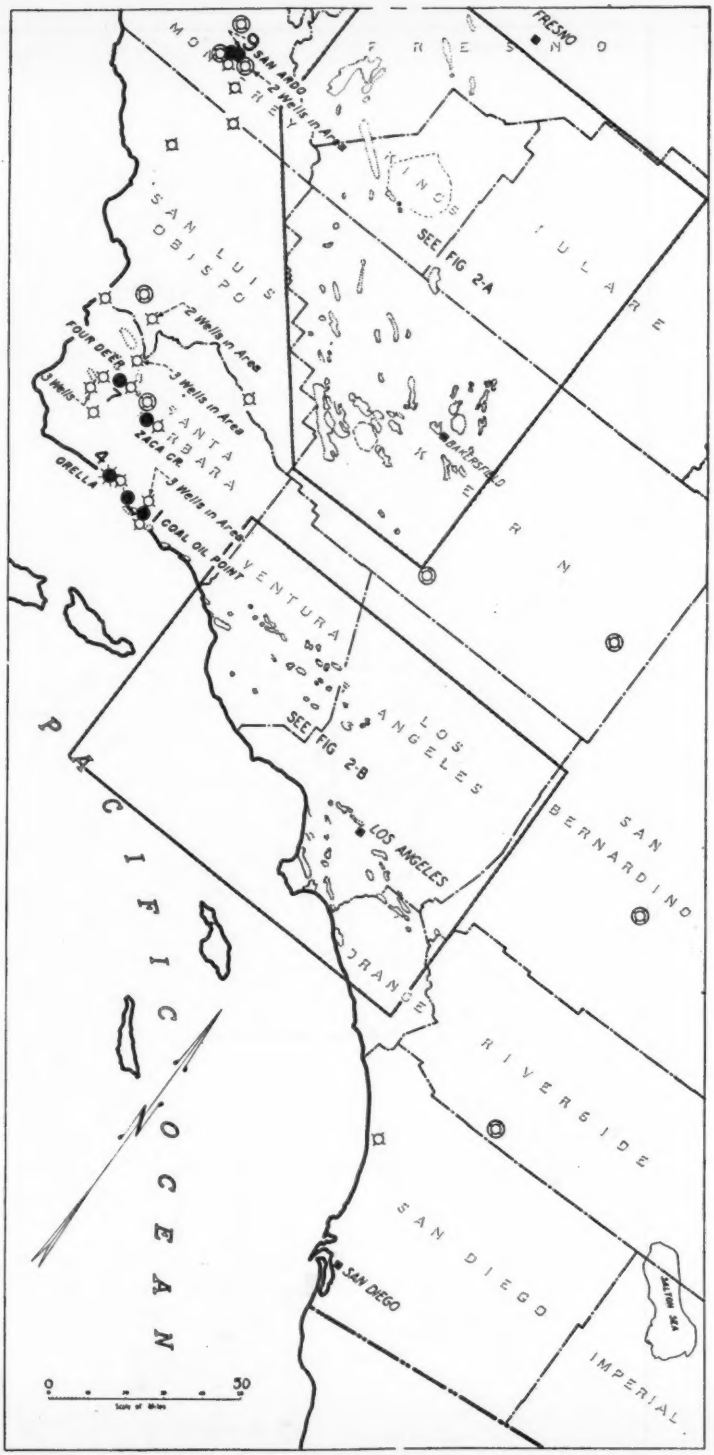
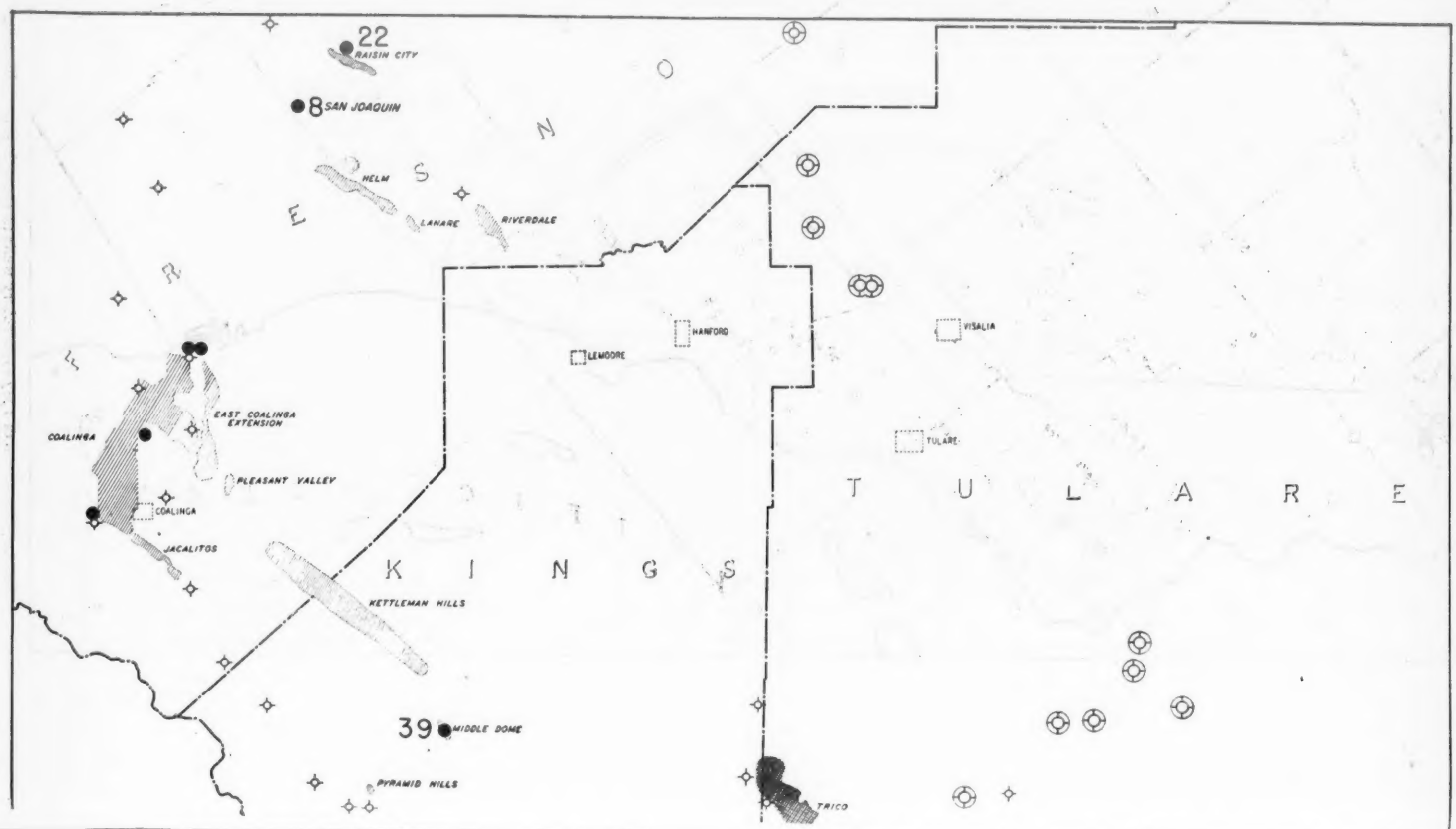


FIG. 2.—Locations of 1947 exploratory wells in south half of California.
See Figure 2-A for explanation of symbols.


22
RAISIN CITY
8 SAN JOAQUIN
HELM
LANARE
RIVERDALE
FRESNO
LEMOORE
HANFORD
VISALIA
TULARE
TULARE
EAST COALINGA EXTENSION
COALINGA
PLEASANT VALLEY
COALINGA
JACALITOS
KINGS
KETTLEMAN HILLS
39 MIDDLE DOME
PYRAMID HILLS
TRICO

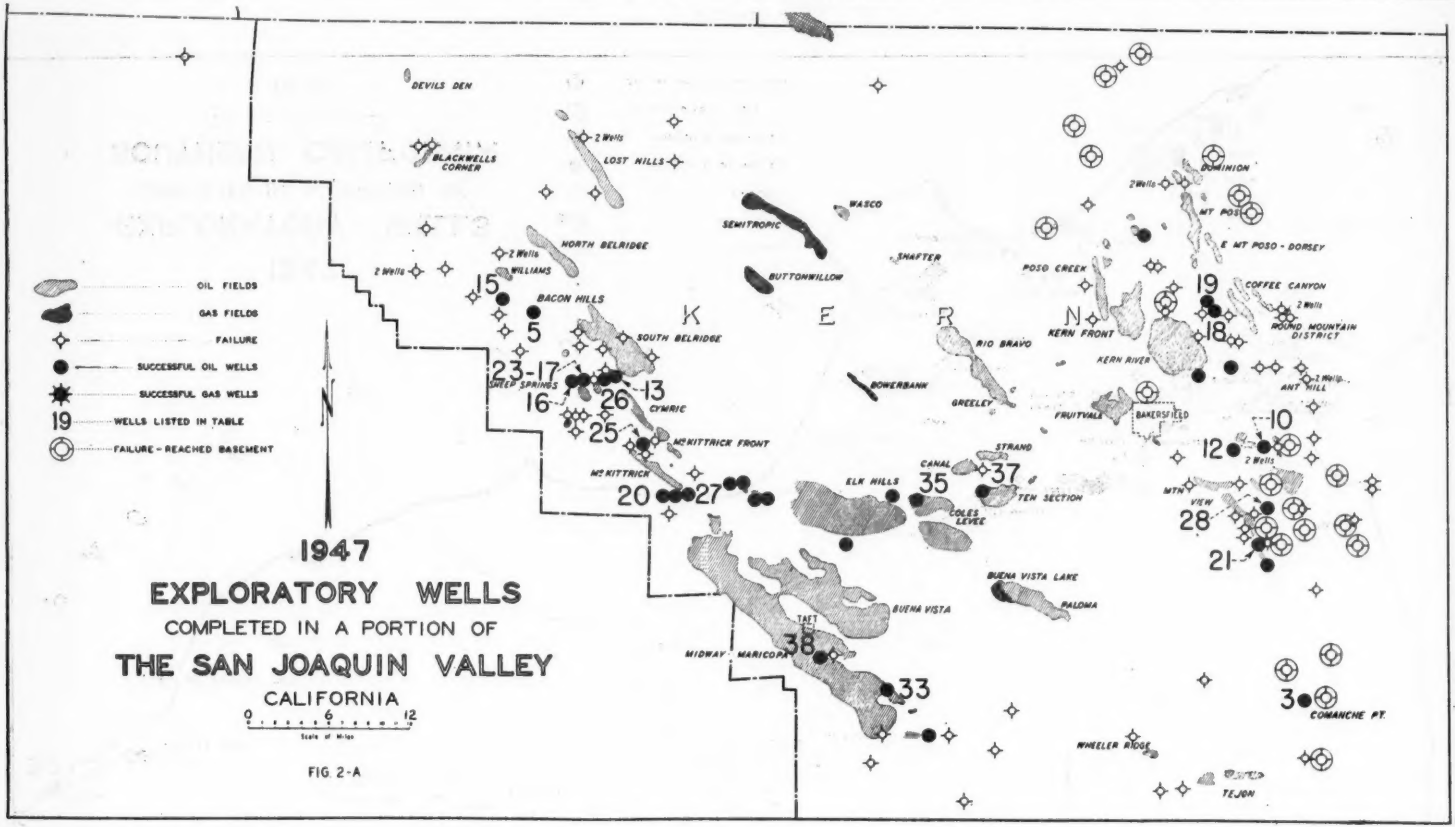

OIL FIELDS
GAS FIELDS
FAILURE
SUCCESSFUL OIL WELLS
SUCCESSFUL GAS WELLS
19 WELLS LISTED IN TABLE
FAILURE - REACHED BASEMENT
1947
EXPLORATORY WELLS
COMPLETED IN A PORTION OF
THE SAN JOAQUIN VALLEY
CALIFORNIA
0 6 12
Scale of Miles
FIG 2-A
DEVILS DEN
BLACKWELLS CORNER
LOST HILLS
2 Wells
WASCO
SEMITROPIC
NORTH BELRIDGE
WILLIAMS
BUTTONWILLOW
SHAFTER
BACON HILLS
SOUTH BELRIDGE
K E R N
POSO CREEK
DOMINION
MT POSO
E MT POSO - DORSEY
COFFEE CANYON
ROUND MOUNTAIN DISTRICT
KERN FRONT
KERN RIVER
RIO BRAVO
BOWERBANK
GREELEY
ANT HILL
FRUITVALE
BAKERSFIELD
SUNSET
CYMRIC
McKITTRICK FRONT
McKITTRICK
STRAND
CANAL
ELK HILLS
TEN SECTION
COLES LEVEE
MTN VIEW
BUENA VISTA LAKE
BUENA VISTA
TAFT
MIDWAY
MARICOPA
WHEELER RIDGE
COMANCHE PT.
TEJON

FIG. 2-A

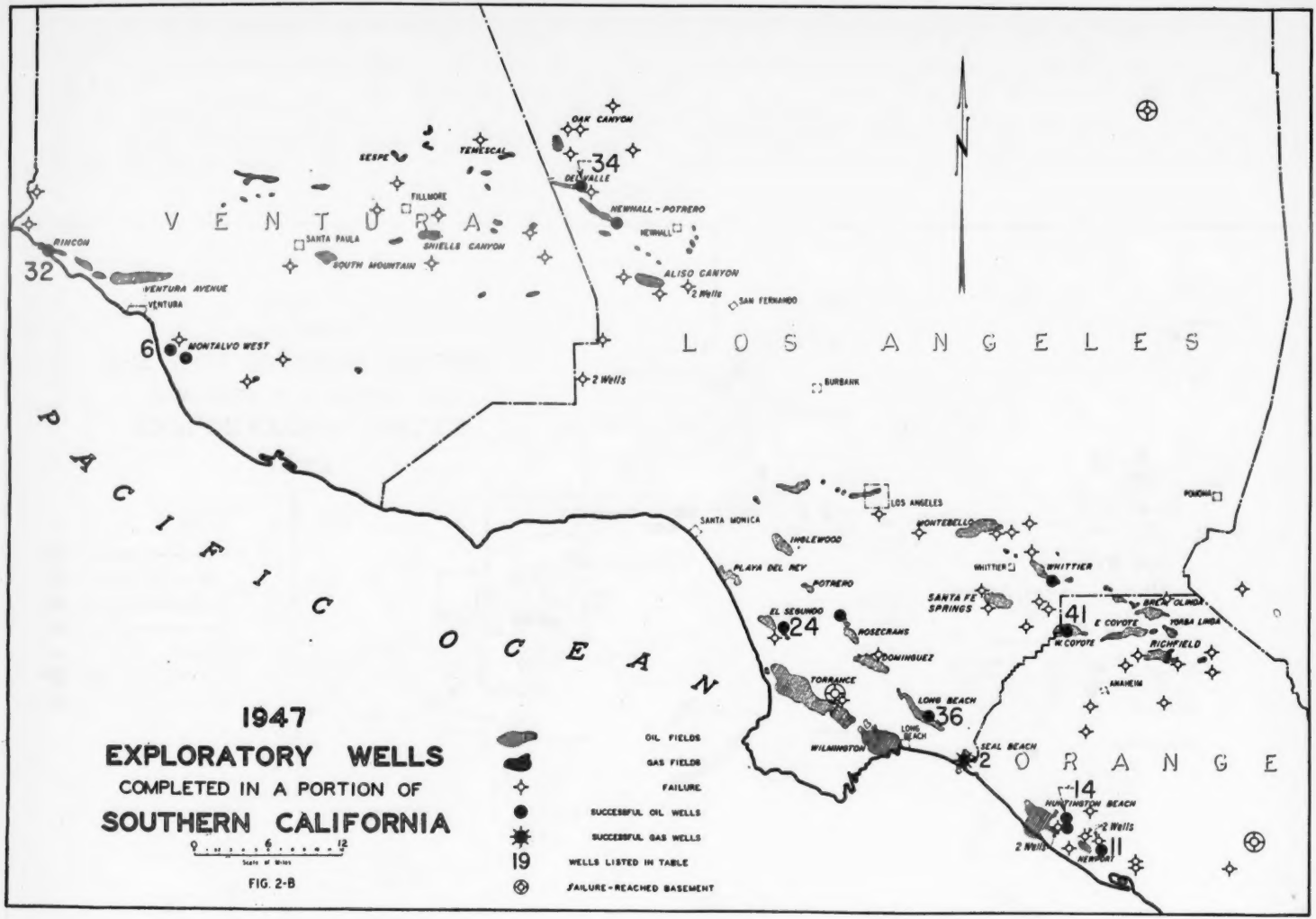

1947
EXPLORATORY WELLS
COMPLETED IN A PORTION OF
SOUTHERN CALIFORNIA
Scale of Miles
FIG. 2-B
OIL FIELDS
GAS FIELDS
FAILURE
SUCCESSFUL OIL WELLS
SUCCESSFUL GAS WELLS
19 WELLS LISTED IN TABLE
FAILURE-REACHED BASEMENT
VENTURA
LOS ANGELES
ORANGE
PACIFIC OCEAN
OAK CANYON
SESPE
TEMESCAL
34
DEL VALLE
FILLMORE
NEWHALL - POTRERO
NEWHALL
SANTA PAULA
SHIELLS CANYON
SOUTH MOUNTAIN
ALISO CANYON
2 Wells
SAN FERNANDO
RINCON
32
VENTURA AVENUE
VENTURA
6
MONTALVO WEST
2 Wells
BURBANK
LOS ANGELES
SANTA MONICA
INGLEWOOD
PLAYA DEL REY
POTRERO
MONTEBELLO
WHITTIER
SANTA FE SPRINGS
BREA OLINDA
E COYOTE
YORBA LINDA
W COYOTE
41
RICHFIELD
EL SEGUNDO
24
ROSECRANS
DOMINGUEZ
TORRANCE
ANAHEIM
LONG BEACH
36
LONG BEACH
WILMINGTON
SEAL BEACH
2
14
HUNTINGTON BEACH
2 Wells
2 Wells
11
NEWPORT

FIG. 2-B

TABLE I

SUMMARY

EXPLORATORY WELL COMPLETIONS BY ALL OPERATORS

CALIFORNIA—1947

	Number of Wells Completed			Exploratory Footage: Total Footage				Average Per Well: Successful Wells	
					Successful Wells				
	All Wells	Successful Wells	Success Percentage	All Wells	Amount[a]	Percentage	All Wells	Successful Footage Only	Total Exploratory Footage Drilled
NEW FIELD WILDCATS:									
Drilled primarily to find oil	177	9	5.1	734,001	46,182[b]	6.3	4,147	5,131	6,195
Drilled primarily to find gas	11	—	—	53,255	—	—	4,841	—	—
Totals	188	9	4.8	787,256	46,182	5.9	4,188	5,131	6,195
NEW POOL WILDCATS:									
Drilled primarily to find oil	75	19	25.3	369,847	70,601[c]	19.1	4,931	3,716	4,076
Drilled primarily to find gas	9	3	33.3	33,850	10,354[d]	30.6	3,761	3,451	4,217
Totals	84	22	26.2	403,697	80,955	20.1	4,806	3,680	4,095
DEEPER POOL TESTS:									
Drilled primarily to find oil	18	8	44.4	61,598[g]	20,031[e]	32.5	3,422	2,504	3,256
Drilled primarily to find gas	1	1	100.0	650	550[f]	84.6	650	550	650
Totals	19	9	47.4	62,248	20,581	33.1	3,276	2,287	2,966
SHALLOWER POOL TESTS:									
Drilled primarily to find oil	2	1	50.0	7,316	5,208	71.2	3,658	5,208	5,208
Drilled primarily to find gas	—	—	—	—	—	—	—	—	—
Totals	2	1	50.0	7,316	5,208	71.2	3,658	5,208	5,208
OUTPOSTS:									
Drilled primarily to find oil	47	25[n]	53.2	250,270	132,648[h]	53.0	5,325	5,306	6,048
Drilled primarily to find gas	12	5[p]	41.7	60,470	20,284[j]	33.5	5,039	4,057	5,048
Totals	59	30	50.8	310,740	152,932	49.2	5,267	5,098	5,881
TOTALS OF ALL EXPLORATORY WELLS:									
Drilled primarily to find oil	319	62	19.4	1,423,032	274,670[k]	19.3	4,461	4,430	5,091
Drilled primarily to find gas	33	9	27.3	148,225	31,188[l]	21.0	4,492	3,465	4,282
Grand totals	352	71	20.2	1,571,257	305,858[m]	19.5	4,464	4,308	4,989

[a] This is net discovery or net successful footage.
[b] Drilled an additional 9,570 feet of dry exploratory hole.
[c] Drilled an additional 6,842 feet of dry exploratory hole.
[d] Drilled an additional 2,296 feet of dry exploratory hole.
[e] Drilled an additional 6,017 feet of dry exploratory hole and 53,640 feet of non-exploratory hole to pass depths of previously productive pools.
[f] Drilled an additional 100 feet of dry exploratory hole and 3,950 feet of non-exploratory hole to pass depth of previously productive pool.
[g] All deeper pool tests for oil drilled an additional 83,208 feet of non-exploratory hole to pass depths of previously productive pools.
[h] Drilled an additional 18,546 feet of dry exploratory hole.
[j] Drilled an additional 4,958 feet of dry exploratory hole.
[k] Drilled an additional 40,975 feet of dry exploratory hole.
[l] Drilled an additional 7,354 feet of dry exploratory hole.
[m] All successful exploratory wells drilled an additional 48,329 feet of dry exploratory hole.
[n] Four of these wells started as outposts but finished as new pool discoveries.
[p] One of these wells started as an outpost but finished as a new pool discovery.

active areas of Figure 2. The large numbers attached to successful wells refer to correspondingly numbered wells in Tables IV, V, and VI.

The numbers of wells, amounts of footage, and success percentages of the 5 types of exploratory wells, subdivided into gas-exploratory and oil-exploratory,

FIG. 2-B

TABLE II

EXPLORATORY WELLS ALLOCATED TO TYPE OF WELL AND TO BASIS FOR LOCATING WELL

	New-Field and New-Pool Wildcats			*Deeper- and Shallower-Pool Tests*			*Outposts*			*Totals*		
		Successful Wells			*Successful Wells*			*Successful Wells*			*Successful Wells*	
	Total Wells	*Number*	*% of Wells*	*Total Wells*	*Number*	*% of Total*	*Total Wells*	*Number*	*% of Total*	*Total Wells*	*Number*	*% of Total*
Surface geology	18	—	—	—	—	—	—	—	—	18	—	—
Surface and subsurface geology and trend	2	2	100.0	—	—	—	—	—	—	2	2	100.0
Surface and subsurface geology and magnetic	1	—	—	—	—	—	—	—	—	1	—	—
Surface and subsurface geology and seismic	3	1	33.3	—	—	—	—	—	—	3	1	33.3
Surface and subsurface geology	49	4	8.2	1	—	—	9	7	77.8	59	11	18.6
Subsurface geology	112	18	16.1	18	9	50.0	36	16	44.4	166	43	25.9
Subsurface geology and trend	10	2	20.0	—	—	—	3	1	33.3	13	3	23.1
Subsurface and trend and gravity	1	—	—	—	—	—	—	—	—	1	—	—
Subsurface and geochemical	1	—	—	—	—	—	—	—	—	1	—	—
Subsurface and core drilling	1	—	—	—	—	—	—	—	—	1	—	—
Subsurface and seismic and gravity	2	—	—	—	—	—	—	—	—	2	—	—
Subsurface and seismic and trend	—	—	—	—	—	—	1	1	100.0	1	1	100.0
Subsurface and seismic	32	2	6.3	2	1	50.0	8	3	37.5	42	6	14.3
Seismic	3	1	33.3	—	—	—	1	1	100.0	4	2	50.0
Seismic and core drilling	1	—	—	—	—	—	—	—	—	1	—	—
Seismic and trend	1	—	—	—	—	—	—	—	—	1	—	—
Trend	1	—	—	—	—	—	—	—	—	1	—	—
Non-technical	27	1	3.7	—	—	—	1	1	100.0	28	2	7.1
Unknown	7	—	—	—	—	—	—	—	—	7	—	—
Totals	272	31	11.4	21	10	47.6	59	30	50.8	352	71	20.2

TABLE II-A

RECAPITULATION OF TABLE II
NUMBER OF WELLS

	All Exploratory Wells			*New-Field and New-Pool Wildcats only*		
	Number	*% of Total*	*Success %*	*Number*	*% of Total*	*Success %*
SURFACE GEOLOGY						
By itself	18	5.1	—	18	6.6	—
Wherever involved	83	23.6	16.9	55	20.2	12.7
SUBSURFACE GEOLOGY						
By itself	166	47.2	25.9	112	41.2	16.1
Wherever involved	292	83.0	22.9	214	78.7	13.6
GEOLOGY—TOTAL[a]						
By itself	260	73.9	22.7	193	71.0	13.5
Wherever involved	313	88.9	21.4	235	86.4	12.3
GEOPHYSICS—TOTAL						
By itself[b]	4	1.1	50.0	3	1.1	33.3
Wherever involved[c]	57	16.2	17.5	44	16.2	9.1
GEOCHEMICAL AND NON-TECHNICAL AND UNKNOWN	35	9.9	5.7	34	12.5	2.9

[a] Includes surface and subsurface geology and trend and core drilling.
[b] This is all seismic.
[c] Includes seismic and gravity and magnetic and electric.

are given in Table I. Exploratory effort was only 3.8 per cent lower in respect to number of wells and 1.0 per cent lower in respect to footage than in 1946.

The success factor for number of wells increased to 20.2 per cent from the 19.1

per cent in 1946 and for footage to 19.5 from the 19.4 per cent in 1946. New-field wildcats, most hazardous of exploratory ventures, were only 4.8 per cent successful as to number and 5.9 per cent successful as to footage. Analogous figures for 1946 were 8.5 per cent and 11.1 per cent, respectively.

Exploratory activity was somewhat less concentrated geographically in 1947 than during the previous year when 80 per cent of exploratory holes were located in Kern, Los Angeles, Orange, Ventura, and Solano counties. The five counties most active in 1947 accounted for only 73 per cent of total exploratory holes and 74 per cent of total exploratory footage. It will be noted from the following list of the five most active counties that Fresno and Santa Barbara have replaced Ventura and Solano from the most active category of 1946.

County	*Number of Exploratory Wells*	*Success Percentage*	*Exploratory Footage Drilled*
Kern	154	21.4	607,469
Los Angeles	35	20.0	221,114
Orange	26	11.5	131,952
Fresno	21	33.3	105,174
Santa Barbara	21	23.8	100,450

Data on 47 unsuccessful exploratory wells that reached basement are given in Table VII. Each of these dry holes is distinguished on Figures 1, 2, 2-A and 2-B by an extra circle around the usual symbol for an abandoned hole.

There were 13 seismograph and no gravimeter parties active at the close of 1947. Comparable figures at the end of 1946 were 12 and 2, respectively.

The relative importance and success of geological, geophysical, and other methods in locating the exploratory holes are given in Tables II and III; the former treats number of wells and the latter footage. Tables II–A and III–A are recapitulations to show the accomplishments of the most important methods by themselves and their total accomplishments through their own efforts and through collaboration with other methods. These recapitulations compare figures for total exploratory holes and for wildcats, both new-field and new-pool.

Tables II, II–A ,III, and III–A are not designed for the purpose of pointing out or starting arguments about the relative merits of different geological and geophysical methods in the search for oil and gas. The basis for locating a well is determined by the committee members when the location is made, not after the well is completed as a producer or abandoned as a failure. The final compilation of Tables II and III is done in detail because the data are available and, it is thought, can be of practical value to those in exploratory work.

Different methods are applicable under different geological conditions and at various stages in the geological knowledge of an area. It is to be expected that subsurface geology will dominate exploratory effort in those areas that have been worked exhaustively by geological and geophysical methods and that have been tested adequately by wells drilled on structures found by those methods. Deeper and shallower pool tests and outposts usually are located on the basis of subsur-

TABLE III. EXPLORATORY FOOTAGE ALLOCATED TO TYPES OF WELL AND TO BASIS OF LOCATING WELL

	New-Field and New-Pool Wildcats			*Deeper- and Shallower-Pool Tests*			*Outposts*			*Total*		
	Total Footage	*Successful Footage*		*Total Footage*	*Successful Footage*		*Total Footage*	*Successful Footage*		*Total Footage*	*Successful Footage*	
		Amount	*% of Total*		*Amount*	*% of Total*		*Amount*	*% of Total*		*Amount*	*% of Total*
Surface geology	79,608	—	—	—	—	—	—	—	—	79,608	—	—
Surface and subsurface geology and trend	10,198	7,330	71.9	—	—	—	—	—	—	10,198	7,330	71.9
Surface and subsurface geology and magnetic	2,503	—	—	—	—	—	—	—	—	2,503	—	—
Surface and subsurface geology and seismic	16,832	4,195	24.9	—	—	—	—	—	—	16,832	4,195	24.9
Surface and subsurface geology	234,048	21,607	9.3	2,840	—	—	65,795	44,235	67.2	302,683	65,902	21.8
Subsurface geology	451,029	65,817	14.6	57,557	25,129	43.7	177,324	84,936	47.9	685,910	175,882	25.6
Subsurface geology and trend	37,022	9,614	26.0	—	—	—	11,118	2,100	18.9	48,140	11,714	24.3
Subsurface geology and trend and gravity	7,369	—	—	—	—	—	—	—	—	7,369	—	—
Subsurface geology and geochemical	3,363	—	—	—	—	—	—	—	—	3,363	—	—
Subsurface geology and core drilling	7,224	—	—	—	—	—	—	—	—	7,224	—	—
Subsurface geology and seismic and gravity	19,222	—	—	—	—	—	—	—	—	19,222	—	—
Subsurface geology and seismic and trend	—	—	—	—	—	—	8,493	4,916	57.9	8,493	4,916	57.9
Subsurface geology and seismic	205,682	15,694	7.6	9,167	660	7.2	44,097	13,218	30.0	258,946	29,572	11.4
Seismic	11,234	2,181	19.4	—	—	—	2,326	2,150	92.4	13,560	4,331	31.9
Seismic and core drilling	9,086	—	—	—	—	—	—	—	—	9,086	—	—
Seismic and trend	2,280	—	—	—	—	—	—	—	—	2,280	—	—
Trend	5,292	—	—	—	—	—	—	—	—	5,292	—	—
Non-technical	73,161	639	0.9	—	—	—	1,587	1,377	86.8	74,748	2,016	2.7
Unknown	15,800	—	—	—	—	—	—	—	—	15,800	—	—
Totals	1,190,953	127,137	10.7	69,564	25,789	37.1	310,740	152,932	49.2	1,571,257	305,858	19.5

TABLE III-A. RECAPITULATION OF TABLE III. FOOTAGE

	All Exploratory Wells			*New-Field and New-Pool Wildcats Only*		
	Footage	*% of Total*	*Success %*	*Footage*	*% of Total*	*Success %*
SURFACE GEOLOGY						
By itself	79,608	5.1	—	79,608	6.7	—
Wherever involved	411,824	26.2	18.8	343,189	28.8	9.7
SUBSURFACE GEOLOGY						
By itself	685,910	43.7	25.6	451,029	37.9	14.6
Wherever involved	1,370,883	87.2	21.8	994,492	83.5	12.5
GEOLOGY—TOTAL[a]						
By itself	1,139,055	72.5	22.9	824,421	69.2	12.7
Wherever involved	1,467,149	93.4	20.4	1,090,758	91.6	11.4
GEOPHYSICS—TOTAL						
By itself[b]	13,560	0.9	31.9	11,234	0.9	19.4
Wherever involved[c]	329,798	21.0	13.0	274,208	23.0	8.0
GEOCHEMICAL AND NON-TECHNICAL AND UNKNOWN	90,548	5.8	2.2	88,961	7.5	0.7

[a] Includes surface and subsurface geology and trend and core drilling.
[b] This is all seismic.
[c] Includes seismic and gravity and magnetic and electric.

face interpretation. It is suggested that a comparison of the merits of various exploratory methods based on their percentages of success should be limited to results of new-field and new-pool wildcats, and furthermore, should be modified to recognize the stage of exploratory development in the area.

Exploratory wells that do not find oil or gas may add substantially to geologic knowledge. All wells that reach basement (Table VII) are important. A few of the other interesting failures follow.

The Western Gulf's S.P. No. 1, Sec. 34, T. 32 S., R. 28 E., was abandoned at 15,092 feet in Santa Margarita which was topped at 14,420 feet. This well had an exceptionally thick section of non-marine Chanac and found permeable sands at approximately 14,000 feet.

The Pacific Western's National Royalties No. 1, Sec. 5, T. 26 S., R. 22 E., found the Vedder in part permeable from 16,225 to 16,668 feet, at which depth the hole was abandoned.

The Shell's K.C.L. No. A–53–30 not only discovered a new deeper pool in the Stevens of the Ten Section field but also drilled more than 5,100 feet of dry exploratory hole below the new pool and found the Vedder impermeable at this location. Total depth of this hole was 14,000 feet.

The Belridge Oil Company's No. 62W–33 was drilled to 14,107 feet in the Belridge field and abandoned. Formation at total depth was Oceanic (Oligocene). This well furnished valuable data on thickness of numerous sands.

DISCOVERIES

There were 7 oil and 2 gas fields (Table IV), and 28 new oil pools and 4 new gas pools (Tables V and VI) credited to the discovery record of 1947. None of these, judged by its performance to date, can be classed as a major discovery.

Two additional new pools were discovered without benefit of exploratory work: (1) the Del Aliso pool in Aliso Canyon, which was opened by plugging back a deep well and perforating opposite Pliocene strata; and (2) the Contact pool in Four Deer, which was brought into production by a development well that was a failure in the Miocene and was plugged to produce from the Pliocene-Miocene contact.

The Richfield Oil Corporation's U.P. Unit No. 3 is credited by some oil men with discovery of the U.P. 3 zone in East Los Angeles. Other authorities say that the U. P. 3 zone is a part of the U.P. 1 zone.

ADDITIONS TO RESERVES

Additions to California's crude-oil reserves during 1947, derived from the annual reserves report of the American Petroleum Institute, were 13,355,000 barrels from new fields and new pools and 124,564,000 barrels from extensions—a total of 137,919,000 barrels, which was 41.5 per cent of the year's production. The crude-oil reserve on December 31, 1947 according to the American Petroleum

b This is all seismic.
• Includes seismic and gravity and magnetic and electric.

TABLE IV. 1947 DISCOVERIES IN CALIFORNIA. SUCCESSFUL NEW-FIELD WILDCATS

Operator	Discovery Well	County	Location S-T-R-	Completion Date	Total Depth (Feet)	Net Discovery Footage	Rated Initial Prodn. B/D	Name of Producing Formation	Name of New Field Discovered	Method of Locating Discovery Well
			WELLS DRILLED PRIMARILY IN SEARCH OF OIL							
1. Honolulu-Signal-Macco	State Permit 309-1	Santa Barbara	19-4n-28w	9-27	7,662	4,195	10	Sespe	Coal Oil Pt.	Surface, subsurface and seismic
2. Marine Exploration	State 1	Los Angeles	11-5s-12w	6-18	8,050	7,935	2,000[a]	Repetto	Anaheim Lding.	Subsurface
3. Reid Exploration	Gould 1	Kern	32-12n-18w	10-25	1,592	639	30	Chanac	Comanche Pt.	Non-technical
4. Rothschild Oil	Orella 1	Santa Barbara	6-4n-30w	12-19[b]	3,140	2,855	5,000[a]	Sespe	Orella	Subsurface
5. Seaboard Oil	Seaboard Bandini 3-21	Kern	21-28s-20e	4-11	8,477	7,876	49	Oceanic	Bacon Hills	Surface and subsurface
6. Standard of California	McGrath 2	Ventura	25-2n-23w	4-16	11,505	8,660	242	Repetto	Montalvo West	Subsurface and seismic
7. Sunray Oil	Los Flores 1	Santa Barbara	4-8n-33w	6-16	5,998	4,830	312	Miocene	Four Deer	Surface, subsurface and trend
8. Superior Oil	Hackala 55	Fresno	32-15s-17e	3-15	7,170	7,034	144	Eocene	San Joaquin	Subsurface and seismic
9. Texas Company	Lombardi 1	Monterey	27-22s-10e	11-5	2,158	2,158	84	Sta. Margarita	San Ardo	Surface and subsurface

[a] =MCF per day. Note that these two wells found gas instead of oil.
[b] This well actually completed in 1946, but was not included in record for that year.

TABLE V. 1947 DISCOVERIES IN CALIFORNIA. SUCCESSFUL NEW-POOL WILDCATS

Operator	Discovery Well	County	Location S-T-R	Completion Date	Total Depth (Feet)	Net Discovery Footage	Rated Initial Prodn. B/D	Age or Name of Prodg. Formation	Name of New Pool Discovered[b]	Method of Locating Discovery Well
			WELLS DRILLED PRIMARILY IN SEARCH OF OIL							
10. British American & Capital	Berry 66-4	Kern	4-30s-29e	10-4	3,560	3,560	106	Miocene	Nozu (Edison)	Subsurface
11. California Exploration	Cagney 1	Orange	28-6s-10w	7-17	4,850	1,604	224	Miocene	Cagney (Newport-Mesa)	Subsurface and trend
12. Getty, G. P.	Mattson 3	Kern	6-30s-29e	1-22	4,616	4,475	100	Miocene	Wicker (Edison)	Subsurface
13. Gould Hills Petroleum	58-8	Kern	8-29s-21e	8-20	1,086	995	12	Pleistocene	Tulare (So. Belridge)	Subsurface
14. Honolulu Oil	Lamb 1	Orange	6-6s-10w	9-12	5,986	5,986	240	Puente	Talbert (Hunt. Beach)	Subsurface
15. Honolulu & Wilshire Oil	Layman 1	Kern	18-28s-20e	3-6	2,213	1,278	354	Miocene	Button Bed (McDonald A.)	Subsurface
16. Independent Exploration	Roco 1	Kern	18-29s-21e	3-3	1,913	1,858	197	Miocene	Roco #1 (Salt Creek)	Subsurface
17. Independent Exploration	Woods 1	Kern	16-29s-21e	12-19	1,760	1,760	25	Pliocene	54-21 Sd. (Salt Creek)	Subsurface
18. M. R. M. Syndicate	Claire 4	Kern	22-28s-28e	1-27	2,945	2,661	45	L. Miocene	Pyramid H. (Round Mt.)	Subsurface
19. Morton & Kohlbush	Alma 1	Kern	15-28s-28e	3-7	2,746	2,746	160	Miocene	M & K? (Round Mt.)	Subsurface
20. Pacific Western Oil	Midway-McKittrick A84-30	Kern	30-30s-22e	8-6	5,196	4,830	570	Pt. of Rocks	Eocene A84 (McKittrick)	Subsurface
21. Pacific Western Oil	P. H. Greer 53	Kern	9-31s-29e	12-23	7,323	7,323	300	Schist	So. Mt. View (Mt. View)	Subsurface
22. Pauley, E. W.	N.C.C. 78-11	Fresno	11-15s-17e	6-29	5,244	4,812	70	Miocene	Up. Zilch (Raisin City)	Subsurface
23. Rothschild-Bender Oil	Sheep Springs 8	Kern	17-29s-21e	7-1	4,904	4,904	250	Oligocene	Oceanic Sd. (Salt Crk.)	Subsurface
24. Seaboard Oil	Johnson 1	Los Angeles	17-3s-14w	8-4	8,026	8,010	405	Puente	Johnson (Lawndale)	Subsurface and trend
25. Standard of California	73-1Y	Kern	1-30s-21e	11-28	1,734	1,734	10	Up. Miocene Sh.	73-1Y (McKittrick)	Subsurface
26. Superior Oil	Moore 3	Kern	16-29s-21e	10-25	2,063	2,063	38	Pliocene	Etchegoin (Sheep Sprg.)	Subsurface
27. Texas Company	Tulare NCT One 28-28	Kern	28-30s-22e	5-26	6,548	5,960	51	Pt. of Rocks	Eocene 28 (Belgian A.)	Surface and subsurface
28. Union Oil Company	Porter 74-28	Kern	28-30s-29e	4-12	4,730	4,042	66	Miocene	Sta. Margarita (Mt. View)	Subsurface
			WELLS DRILLED PRIMARILY IN SEARCH OF GAS							
29. Shell Oil Company	Wagenet 2	Solano	19-4n-1e	4-30	6,000	5,673	17,500[a]	Martinez	Wagenet 2 (Kirby Hill)	Surface and subsurface
30. Standard of California	Donohoe Fee 2	Butte	7-20n-1e	9-14	2,450	2,181	4,344[a]	Donohoe Sd.	Donohoe 2 (Durham)	Seismic
31. Standard of California	Kirby Community 5	Solano	23-4n-1w	8-19	4,200	2,500	2,408[a]	Meganos	Kirby 5 (Kirby Hill)	Surface, subsurface and trend

[a] =MCF per day.
[b] =Field names in brackets.

TABLE VI. 1947 DISCOVERIES IN CALIFORNIA. SUCCESSFUL DEEPER AND SHALLOWER-POOL TESTS

TABLE VI. 1947 DISCOVERIES IN CALIFORNIA. SUCCESSFUL DEEPER AND SHALLOWER-POOL TESTS

Operator	Discovery Well	County	Location S-T-R	Completion Date	Total Exploration Footage	Net Discovery Footage	Rated Initial Prodn. B/D	Name or Age of Producing Formation	Name of New Pool Discovered[b]	Method of Locating Discovery Well
DEEPER POOL TESTS[a]										
WELLS DRILLED PRIMARILY IN SEARCH OF OIL										
32. C.C.M.O. Company	Hobson C-11	Ventura	17-3N-24W	10-17[d]	3,655	3,060	26	L. Pliocene	C-11 Pool (Rincon)	Subsurface
33. General Petroleum	Pacific 4	Kern	32-12N-23W	6-16	445	445	1,078	McLure Shale	Pacific 4 (Maricopa)	Subsurface
34. Havenstrite, R. E.	Lincoln 15	Los Angeles	16-4N-17W	8-26	3,565	3,462	125	Puente-Topango	Lincoln 15 (Del Valle)	Subsurface
35. Richfield Oil	CL-A 68-29	Kern	29-30S-25E	12-11	862	862	441	Stevens	68-29 Pool (Coles Levee)	Subsurface
36. Shell Oil	Dolley 2	Los Angeles	29-4S-12W	7-13	6,344	6,165	1,000	Puente	De Soto (Long Beach)	Subsurface
37. Shell Oil	KCL-A 53-30	Kern	30-30S-26E	9-26	5,800	660	447	L. Stevens	53 Pool (Ten Section)	Subsurface and seismic
38. Standard of California	56-30D	Kern	30-32S-24E	12-30	778	778	269	Miocene	56-30 Pool (Maricopa)	Subsurface
39. Standard of California	73-30V	Kings	30-23S-19E	2-16	4,599	4,599	296	Avenal	Eocene (Kett. Middle Dome)	Subsurface
WELLS DRILLED PRIMARILY IN SEARCH OF GAS										
40. Standard of California	Suisun Community 7	Solano	5-3N-1W	12-8	650	550	11,040[c]	Domengine	Suisun 7 (Suisun Bay)	Subsurface
SHALLOWER-POOL TESTS										
WELLS DRILLED PRIMARILY IN SEARCH OF OIL										
41. Standard of California	Murphy 193	Orange	18-3S-10W	1-19	5,208	5,208	315	Repetto	138 Pool (W. Coyote)	Subsurface

[a] Successful deeper pool tests drilled an additional 57,590 feet of non-exploratory hole to pass depths of previously producing pools.
[b] Field names in brackets.
[c] MCF per day.
[d] This wel actually completed in 1946, but was not included in record for that year.

TABLE VII. UNSUCCESSFUL CALIFORNIA EXPLORATORY WELLS THAT REACHED BASEMENT IN 1947

Operator and Lease	Location S-T-R-	Total Depth	Type of Rock
FRESNO COUNTY			
42. Riverbend Oil 1 Guggenheim	5-15S-23E	1,401	Granite
KERN COUNTY			
43. Angus, Albert 1 Tejon	19-32S-30E	534	Granite
44. Blake, T. M. 1 Chuck	28-10N-17W	3,922	Granodiorite
45. Davis Investment 1 Bauman	8-30S-30E	2,456	Granite?
46. Didier, L. H. 1 Didier	10-31S-30E	910	Granite
47. General Petroleum 32-2 Glazier	2-30S-29E	5,809	Schist
48. Hancock Oil 1 Di Giorgio	4-31S-29E	6,475	Schist
49. Harp and Brown 1 Quinn	11-25S-27E	2,347	Granite
50. Independent Exploration 81-15 Kuhn	15-27S-26E	7,737	Schist
51. Jergins Oil 17 Bigelow	1-31S-29E	3,053	Granite
52. Johnson, J. E. 1 M & R	9-32S-39E	2,422	Granite
53. Mauer and Fisher 5 Jean	15-26S-28E	1,050	Schist
54. Monterey Exploration 52 Nozu-Berry	22-30S-29E	3,624	Schist
55. Reid Exploration 2 Gould	33-12N-18W	1,261	Granite
56. Reid Exploration 1 Josephine	33-30S-30E	416	Granite
57. Reid Exploration 1 K & M	7-27S-29E	1,202	Granite
58. Reid Exploration 3 Tejon	27-32S-29E	1,831	Granite
59. Richfield Oil B-1 Tejon	28-11N-18W	1,613	Granite
60. Runnels Exploration 1 Runnels	1-27S-28E	850	Granite
61. St. Anthony Oil 1 St. Anthony	18-28S-28E	5,657	Granite
62. Shell Oil 1 Guthrie-McCaleb	12-26S-26E	5,280	Granite
63. Superior Oil 57 KCL-A	13-29S-27E	8,232	Basement
64. Superior Oil 51 Quinn	20-25S-27E	3,926	Granite
65. United Exploration 65-26 Weichelt	26-30S-29E	2,915	Schist
66. Universal Consolidated 1 Marquis	19-26S-27E	5,262	Granite
67. Western Gulf Oil 2 Di Giorgio	10-31S-29E	6,468	Schist
LOS ANGELES COUNTY			
68. Jerman, R. W. 1 Torrance	23-4S-14W	5,808	Schist
69. Willette Oil 1 Virginia Lee	20-5N-9W	3,798	Basement
MONTEREY COUNTY			
70. C.C.M.O. Oil 6-G-1 San Ardo	6-23S-10E	8,062	Gneiss
71. Jergins & No. Amer. Cons. 23-35 San Ardo	35-22S-10E	2,490	Granite
72. Jergins & No. Amer. Cons. 1 Rosenburg	34-22S-10E	2,500	Granite
73. Texas Company 1 Twisselman	25-21S-9E	534	Granite
ORANGE COUNTY			
74. Morton & Sons 174-1 Irvine	10-6S-8W	4,473	Basement
RIVERSIDE COUNTY			
75. Palomar Petroleum 1 Tyrell	13-8S-1W	2,594	Granite
SAN BERNARDINO COUNTY			
76. Allied Oil & Gas 1 Chief	17-4N-1W	1,766	Granite
SAN LUIS OBISPO COUNTY			
77. Union Oil 1 Mary Phelan	32-12N-34W	4,297	Basement
SANTA BARBARA COUNTY			
78. Union Oil 1 Giorgi	12-8N-32W	4,497	Basement
TULARE COUNTY			
79. Frakes Oil 1 Toscan	28-16S-23E	2,930	Slate
80. Pacific Western Oil B-1 Brunner	16-24S-25E	7,462	Granite
81. Reid Exploration & Mayo 1 Mayo	13-23S-26E	3,456	Slate
82. Reid Exploration 1 Miami	23-22S-27E	815	Granite
83. Smith & Larsen 1 Moore	28-22S-27E	592	Schist
84. Smith, Larsen & Reid 1 Smith	7-23S-28E	592	Schist
85. Superior Oil 24 Day	22-23S-26E	4,173	Basement
86. Superior Oil 1 Huntley	7-18S-24E	3,811	Slate
87. Superior Oil 18-8 McGee	8-18S-24E	3,650	Basement
88. Superior Oil 1 Pratt	15-17S-23E	3,887	Slate

Institute was 3,294,963,000 barrels, a net increase of 1,472,000 barrels over the previous year's figure.

The estimate of natural gas liquids reserves prepared jointly by committees of the American Petroleum Institute and the American Gas Association was 312,151,000 barrels on December 31, 1947, a net increase of 3,879,000 barrels during 1947.

The reserves of gas on December 31, 1947, were given by the American Gas Association as 10,164,356,000 MCF, a decrease of 961,945,000 MCF from the previous year.

DEVELOPMENTS

There were 1,599 producing oil wells completed during 1947, an increase of 224 wells or 16 per cent above 1946 completions. They had a rated average initial production of 214 barrels daily; the comparable figure for 1946 was 287 barrels daily. These figures and those in the following tabulation were compiled from monthly reports issued by the American Petroleum Institute.

The twelve most active fields which accounted for 64 per cent of the total of producers completed and 63 per cent of the total initial production added are given in the following tabulation.

	Number of Producing Wells Completed	*Rated Initial Production (Barrels Daily)*	
		Total	*Per Well Average*
Wilmington	258	112,947	438
Belridge, South	119	2,291	19
Huntington Beach	117	13,326	114
Kern River	108	3,641	34
Lost Hills	99	4,666	47
Midway-Sunset	62	6,387	103
Newport	51	10,581	207
Salt Creek	46	11,825	257
Ventura Avenue	44	22,913	521
Kern Front	42	1,526	36
Paloma	37	17,282	467
Lompoc	37	6,385	173

Kern River produced 3,613,000 barrels during 1946 and at the end of that year had produced 294 million barrels during its 47-year life. Operators completed 108 producing wells during 1947 and increased annual production to 3,728,000 barrels. Daily average production was stepped up from 9,570 (4.65 barrels per well day) in December, 1946, to 11,080 (5.0 barrels per well day) in December, 1947. The average rated initial daily production of the 108 completions was about 34 barrels. The rejuvenation of this venerable field was a real achievement.

Belridge South and Lost Hills are two old fields that continued to extend productive limits and add substantial amounts to daily production.

Salt Creek, a 1946 discovery, increased from 21 wells producing 2,752 barrels daily in December, 1946, to 68 wells producing 6,442 barrels daily in December, 1947.

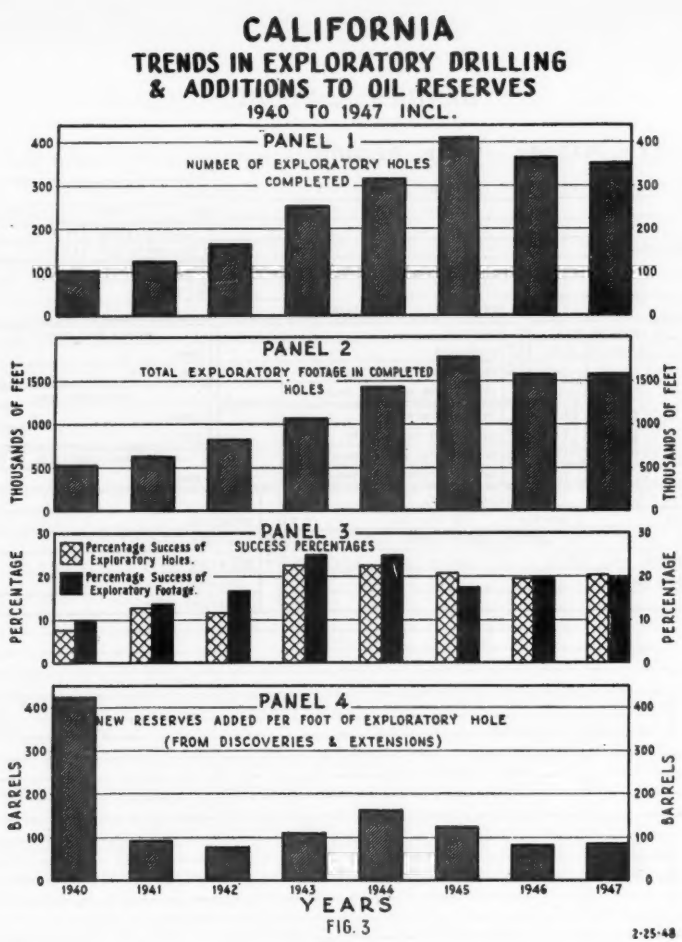

CALIFORNIA
TRENDS IN EXPLORATORY DRILLING
& ADDITIONS TO OIL RESERVES
1940 TO 1947 INCL.
PANEL 1
NUMBER OF EXPLORATORY HOLES COMPLETED
PANEL 2
TOTAL EXPLORATORY FOOTAGE IN COMPLETED HOLES
THOUSANDS OF FEET
PANEL 3
SUCCESS PERCENTAGES
Percentage Success of Exploratory Holes.
Percentage Success of Exploratory Footage.
PERCENTAGE
PANEL 4
NEW RESERVES ADDED PER FOOT OF EXPLORATORY HOLE
(FROM DISCOVERIES & EXTENSIONS)
BARRELS
1940 1941 1942 1943 1944 1945 1946 1947
YEARS
FIG. 3
2-25-48

FIG. 3

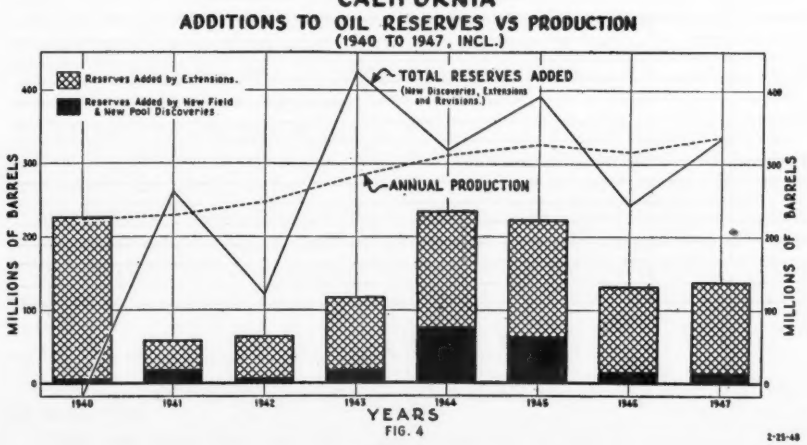

CALIFORNIA
ADDITIONS TO OIL RESERVES VS PRODUCTION
(1940 TO 1947, INCL.)
Reserves Added by Extensions.
Reserves Added by New Field & New Pool Discoveries
TOTAL RESERVES ADDED
(New Discoveries, Extensions and Revisions.)
ANNUAL PRODUCTION
MILLIONS OF BARRELS
1940 1941 1942 1943 1944 1945 1946 1947
YEARS
FIG. 4
2-25-48

FIG. 4

EXPLORATORY WELL RECORD

STATE: REGION:
DISTRICT: COUNTY:
COMPANY:
LEASE & WELL NO.:
LOC:

CO.:
WELL:
Sec. Twp. Rge.

CLASSIFICATION	Initial:
Success/Failure	Final:

DATE: Spud: / Compl: / Aban.:

ELEV.: FINANCING:

BASIS FOR LOCATING WELL

GEOLOGY				GEOPHYSICS				OTHER		
Surface	Subsurface	Trend	Core drilling	Seismic	Gravity	Magnetic	Electric	Geo-chemical	Non-technical	Unknown

DEPTH	
Total	
Producing	
(a) Previous producing zone	
(b) Deepest previous test	

FOOTAGE	
Total Exploratory	
Successful Exploratory	
Unsuccessful Exploratory	
Non-exploratory to pass (a)	

BOTTOM HOLE FORMATION
Name:
Age:

PRODUCING ZONE
Name:
Age:

BOTTOM HOLE FORMATION IN (b)
Name:

PRODUCTION DATA

Rated I.P. (Test Hrs/Days) Oil/Cond. B/D
Choke ; Gravity (c) API; Cut %
Gas MCF/Day; Gas/Oil Ratio
Pressure, psig: Tubing Casing S.I.
Casing Record:

NAME

AREA:
STRUCTURE:
NEW FIELD:
OLD FIELD:
NEW POOL:
EXTENDED POOL:

Remarks:

DATE	DEPTH	REMARKS

FIG. 5

Forty-seven producing wells were completed in dry gas pools, 8 less than in 1946. The most active gas field was Trico in which 20 producers, 42.5 per cent of all successful dry gas wells, were completed.

Production during 1947 increased substantially over that for 1946 and was as follows.

Crude oil	333,164,000 barrels
Natural gas liquids, including condensate	24,917,000 barrels
Natural gas*	559,894,000 MCF

* Includes both dry gas-field gas and oil-well gas but excludes from the latter shrinkage caused by extraction of natural gas liquids.

The completion of the gas line from Texas to Southern California and the increase in price of crude oil are two 1947 developments of great importance. Both of these have been thoroughly discussed in the press and require no further comment here.

A new depth record was attained by the Standard Oil Company of California's Maxwell No. 1 in the Montalvo area, Ventura County, which was drilling below 17,000 feet at the end of 1947.[4]

TRENDS

Panels 1 to 3 of Figure 3 show that exploratory effort continued at a high rate during 1947 and that success percentages were slightly better than in 1946. The downward trend in number of wells and amount of footage indicated between 1945, the last war year, and 1946 was halted in 1947. Exploratory drilling in both 1946 and 1947 exceeded all years subsequent to 1939 with the exception of 1945.

Panel 4, Figure 3, and all of Figure 4 are based on production and reserves data published annually by the American Petroleum Institute. The article on 1946 California developments[5] contained a brief discussion on the estimates of reserves used in Figures 3 and 4.

The rewards per foot of exploratory hole (Panel 4, Fig. 3) were a little greater in 1947 than in the preceding year but not enough better to generate enthusiasm.

Total reserves added during 1947 (Fig. 4) were substantially higher than in 1946, although new fields and new pools added approximately the same amount in both years and reserves added by extensions were only slightly more in 1947 than in the preceding year. Revisions of previous estimates accounted for most of the difference between the results of the two years.

A pessimist might look at Figures 3 and 4 and decide that there was little chance of satisfactory reward from further exploration in California. An optimist, on the contrary, might be impressed by the sustained success percentages, might even see some indication of a reversal in the downward trend (evident since 1944) of rewards as measured in terms of reserves added by discoveries and extensions or reserves added per foot of exploratory hole, and could conclude that further exploration in California might pay substantial dividends. The industry here, fortunately, is sufficiently supplied with optimists to assure us that intensive exploration will continue. To the optimists will accrue the rewards.

[4] Well was abandoned early in 1948 at total depth 17,696 feet when the drill pipe stuck and could not be recovered.

[5] *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 31, No. 6 (June, 1947), p. 945.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 886-892, 3 TABLES

DEVELOPMENTS IN ROCKY MOUNTAIN REGION IN 1947[1]

HENRY CARTER REA[2]
Casper, Wyoming

ABSTRACT

There were sixteen new discoveries made in the Rocky Mountain region during 1947. Of these sixteen discoveries, six were based on surface geology, seven on geophysics, and three on a combination of geophysics and geology.

The commercial production of oil from the Casper formation (Pennsylvanian) at Herrick Dome in the Laramie Basin, Wyoming, opened another producing zone in this area that had heretofore been considered doubtful. Production of oil from the Kibbey sand (upper Mississippian) at Ragged Point, Montana, can be classed as a new producing zone in that state. The presence of commercial oil in the Madison limestone (Mississippian) in the Lost Soldier field of Wyoming opened a hitherto unknown reserve in an old established field.

Twenty-five successful outpost wells were drilled during the year and five successful deep-pool tests were completed. New reserves to the extent of 160 million barrels of oil were added to the present proved reserves of the Rocky Mountain region.

The successful development of shallow sand traps along the northeast rim of the Powder River Basin in Wyoming indicates similar possibilities in other areas of the Rocky Mountain region.

Exploration activity was the highest on record, with a total of eighty seismograph parties and forty-six gravity parties operating in the region at one time. The most intense geophysical work and the largest number of crews was concentrated in the basin areas of Wyoming. Also significant was the acceptance by the industry of photogeology as an economic exploration method. More than 110,000 square miles of the region were photogeologized with the discovery of many unmapped structures and areas of potential structural significance.

INTRODUCTION

The Rocky Mountain region, including Colorado, Wyoming, Montana, Utah, North Dakota, and South Dakota, had a decrease in the actual number of wells drilled in 1947 but experienced a very definite intensification of exploratory activity. During the year there were 815 wells drilled in the region, of which sixteen were successful wildcat wells making new discoveries, which added 160 million barrels to the proved reserves.

During the year there were eighty seismograph parties and forty-six gravity parties operating in the Rocky Mountain region. In addition to the surface geological parties there has been a decided trend to photogeology as a rapid reconnaissance method.

Production in Colorado and Wyoming showed gains over the previous year but Montana showed a decline. With few exceptions, most of the known shallow surface structures have been tested and exploration is trending toward the deeper parts of the basins where geophysics is the main exploratory method used. The discovery of oil, late in the year, in The Texas Company's Adon well in Campbell County, Wyoming, out in the Powder River Basin, attracted attention to the possibilities of the deeper basinward structures.

The successful exploratory drilling for shallow sand traps in the Newcastle-Mush Creek-Osage area, along the northeastern rim of the Powder River Basin,

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, March 3, 1948.

[2] Consulting geologist.

stimulated one of the biggest leasing campaigns in the region. This trend play extends from the Lance Creek field at the southern end of the Powder River Basin northward more than 140 miles, extending across the state line into Montana. The development of oil-bearing sand bodies in the Cretaceous shales at relatively shallow depths definitely indicated that possibilities for commercial production were not dependent on structural considerations alone. This factor is emphasized to suggest that there are other areas in the Rocky Mountain region where similar geologic conditions have been neglected in the intense search for structural traps.

In the past practically all drilling of wildcat wells was based on surface geology but now the trend is developing to make locations on a combination of surface geology and seismic work. As the surface leads become scarcer and as more wells are drilled in the basins, this trend will gradually go over to subsurface leads combined with seismic work. The outlook for wildcat drilling in this region is still bright and the drilling curve will undoubtedly continue to rise during the next five years at least.

Table I summarizes the drilling activity in the Rocky Mountain region in 1947.

TABLE I

DRILLING, 1947

	Oil Wells	*Gas Wells*	*Dry Holes*	*Total Wells Completed*		*Change*
				1947	*1946*	
Colorado	152	7	50	209	167	+42
Montana	152	93	64	309	313	− 4
South Dakota	0	1	2	3	9	− 6
Utah	0	0	9	9	4	+ 5
Wyoming	172	19	76	267	168	+99

PRODUCTION

(Thousands of barrels)

	1947	*1946*	*Change*
Colorado	15,640	11,591	+4,049
Montana	8,744	9,029	− 285
Wyoming	44,582	38,544	+6,038

COLORADO

NEW-FIELD WILDCATS

Chromo.—Archuleta County. Florence and Teague's Fitzhugh No. 1, Sec. 4, T. 32 N., R. 1 E. Completed February 8, 1947, at 471 feet in Greenhorn lime for 200 barrels of oil per day, pumping. Location based on surface geology.

Maudlin Gulch.—Moffat County. Texas Company *et al.*, Unit No. 1, Sec. 35, T. 4 N., R. 95 W. Completed November 1, 1947, at 6,229 feet in the Morrison formation for 61 barrels of oil and 36 barrels of water per day. Location based on surface geology.

Ridgeway.—Ouray County. Hackathorn Drilling Company's Ashing Ranch No. 1, Sec. 11, T. 45 N., R. 8 W. Completed at 410 feet in the Dakota sand for 200,000 cubic feet of gas per day. Location based on surface geology.

SUCCESSFUL OUTPOST WELLS

East Hiawatha.—Moffat County. Mountain Fuel Company's State No. 3, Sec. 37, T. 12 N., R. 100 W. Completed July 15, 1947, at 3,225 feet in Wasatch sand for 1,460,000 cubic feet of gas per day. Total depth, 4,084 feet. Based on surface and subsurface geology, this well extended the producing limits of the field ¾ mile west.

Powder Wash.—Moffat County. Sprecher Drilling Company's Government No. 1, Sec. 34, T. 12 N., R. 97 W. Completed July 10, 1947, at 4,634 feet in Wasatch sand for 62 barrels of oil and 40 barrels of water per day, pumping. Total depth, 5,225 feet. Location based on surface and subsurface geology, extended production ¾ mile east.

Attempts to extend the present producing limits of the Rangely field southeast and northwest were unsuccessful.

MONTANA

NEW-FIELD WILDCATS

Northwest Elk Basin.—Carbon County. Sinclair-Wyoming Oil Company's Wilkins No. 1, Sec. 28, T. 9 S., R. 23 E. Completed July 21, 1947, in Madison limestone at 6,795 feet for 4,942 barrels of oil per day, flowing. Location based on combination of surface geology and seismic work.

Cassaday.—Hill County. Bronson's Agoretta No. 1, Sec. 33, T. 34 N., R. 17 E. Completed October 21, 1947, at 693 feet in the Eagle sandstone for 681,000 cubic feet of gas per day. Location based on surface gology.

East Keith.—Liberty County. Texas Company's Colby No. 1, Sec. 13, T. 36 N., R. 6 E. Completed December 5, 1947, at 3,140 feet in the Colorado shale and Ellis shale for 9,000,000 cubic feet of gas per day. Total depth, 4,970 feet in Madison limestone. Location based on seismic work.

Ragged Point.—Musselshell County. Texas Company's Manion No. 1, Sec. 5, T. 11 N., R. 30 E. Completed December 7, 1947, at 4,557 feet in the Kibbey formation for 235 barrels of oil per day, flowing. Total depth, 6,312 feet in Madison limestone. Location based on surface geology.

Sixshooter.—Sweetgrass County. R. C. Tarrant's Opland No. 1, Sec. 10, T. 3 N., R. 18 E. Completed July 27, 1947, at 550 feet in Claggett shale for 300,000 cubic feet of gas per day. Total depth, 632 feet. Based on surface geology.

MONTANA

SUCCESSFUL OUTPOST WELLS

North Cut Bank.—Glacier County. Union Oil Company of California's Tetrude No. 2, Sec. 34, T. 36 N., R. 5 W. Completed May 3, 1947, at 2,904 feet in Madison limestone for 10,000,000 cubic feet of gas per day. Location based on subsurface geology and trend.

Northwest Elk Basin.—Carbon County. Sinclair-Wyoming Oil Company's Helen No. 1, Sec. 29, T. 9 S., R. 23 E. Completed December 4, 1947, at 3,451 feet in Second Wall Creek sand for 66 barrels of oil per day, by swabbing. Location based on surface and seismic work.

Utopia.—Liberty County. Texas Company's Alvord No. 1, Sec. 14, T. 33 N., R. 4 E. Completed October 22, 1947, at 2,200 feet in Kootenai formation for 7 barrels of oil per day, pumping. Location based on subsurface geology and seismic work and extended production ¾ mile southeast.

Reagan.—Glacier County. Montana Power Company's Tribal No. 1, Sec. 10, T. 37 N., R. 7 W. Completed June 3, 1947, at 3,770 feet in Madison limestone for 12,000,000 cubic feet of gas per day. Location based on combination of surface geology and seismic work and extended production 1½ miles north.

North Cut Bank.—Glacier County. Texas Company's Dooren Brothers No. 1, Sec. 25, T. 36 N., R. 6 W. Completed March 18, 1947, in Madison limestone for 22 barrels of oil per day, pumping. Located on subsurface geology and trend, extended producing limits of field 1 mile south.

North Cut Bank.—Glacier County. Union Oil Company of California's Laugabeer No. 8, Sec. 7, T. 35 N., R. 5 W. Completed September 27, 1947, in Madison limestone at 3,089 feet for 175 barrels of oil per day, flowing. Located on trend and subsurface geology, extended limits of the field ½ mile west.

North Cut Bank.—Glacier County. Texas Company's Ammerman No. 2, Sec. 26, T. 36 36 N., R. 6 W. Completed November 24, 1947, in Cut Bank sand at 3,160 feet for 3 barrels of oil per day, pumping. Based on subsurface geology, this well extended the productive limits of the field ¾ mile northeast.

North Cut Bank.—Glacier County. Union Oil Company of California's McNamer No. 2, Sec. 14, T. 35 N., R. 5 W. Completed June 25, 1947, in Madison limestone at 2,915 feet for 17,000,000 cubic feet of gas per day. Located on subsurface geology, this well extended production 3½ miles east.

Flat Coulee.—Liberty County. A. B. Cobb's Miller No. 1, Sec. 15, T. 37 N., R. 5 E. Completed October 14, 1947, in Colorado shale at 1,785 feet for 5,000,000 cubic feet of gas per day. Based on subsurface geology, this well extended the limits of the field ⅔ mile south.

East Keith.—Liberty County. Texas Company's Osler No. 1, Sec. 23, T. 36 N., R. 6 E. Completed December 5, 1947, in Colorado shale and Ellis shale at 3,200 feet for 6,000,000 cubic feet of gas per day. Located on seismic work, this well extended production 1 mile west.

Kevin-Sunburst.—Toole County. Pacific Western Oil Company's Donovan No. 1, Sec. 25, T. 35 N., R. 4 W. Completed August 26, 1947, in Madison limestone at 1,934 feet for 20 barrels of oil per day pumping. Located on trend, extended productive limits of field 1¾ miles southwest.

WYOMING

NEW-FIELD WILDCATS

Seven Mile.—Albany County. California Company and Phillips Petroleum Company's Christiana No. 1, Sec. 8, T. 17 N., R. 77 W. Completed October 23, 1947, at 5,833 feet in Muddy sand. Total depth, 6,776 feet for 45 barrels of oil per day, pumping. Located on seismic work.

Herrick Dome.—Albany County. Superior Oil Company of California's Herrick No. 1, Sec. 1, T. 16 N., R. 76 W. Completed February 24, 1947, at 3,675 feet in Casper formation for 245 barrels of oil in 15 hours. Located on seismic work.

East Antelope.—Fremont County. Continental Oil Company and General Petroleum Corporation's Unit No. 1, Sec. 26, T. 27 N., R. 93 W. Completed October 9, 1947, at 2,180 feet in Wasatch sand. Total depth, 6,613 feet for 8,980,000 cubic feet of gas per day. Located on seismic work.

North Sage Creek.—Fremont County. Stanolind Oil and Gas Company's Tribal "B," Sec. 4, T. 1 N., R. 1 W. Completed December 22, 1947, at 2,440 feet in the Phosphoria formation. Total depth, 2,525 feet, for 21 barrels of oil and 128 barrels of water per day, pumping. Located on gravity and surface work.

Sand Creek.—Washakie County. General Petroleum Corporation's Government No. 45-26G, Sec. 26. T. 4 N., R. 91 W. Completed September 8, 1947, at 6,753 feet in Third Frontier sand for 265 barrels of oil per day, flowing. Located on seismic work.

South Fork.—Washakie County. General Petroleum Corporation's Government No. 88-24G, Sec. 24, T. 46 N., R. 92 W. Completed May 12, 1947, at 10,105 feet in Phosphoria

formation. Total depth, 10,900 feet, for 202 barrels of oil per day, pumping. Located on seismic work.

Neiber Dome.—Washakie County. California Company and G. and G. Drilling Company's Unit No. 1, Sec. 19, T. 45 N., R. 92 W. Completed February 3, 1947, at 10,216 feet in Phosphoria formation, total depth, 10,990 feet, for 288 barrels of oil in 9 hours and 1,380,000 cubic feet of gas. Located on surface geology and seismic work.

Worland Dome.—Washakie County. Pure Oil Company's Unit. No 1, Sec. 18, T. 48 N., R. 92 W. Completed January 25, 1947, at 10,055 feet in Phosphoria formation, total depth, 11,370 feet, for 165 barrels of oil per day and 300,000 cubic feet of gas, flowing. Located on seismic work.

WYOMING

SUCCESSFUL OUTPOST WELLS

Sand Draw.—Fremont County. Sinclair-Wyoming Oil Company's Unit No. 5, Sec. 14, T. 32 N., R. 95 W. Completed July 14, 1947, at 7,995 feet in Tensleep sand for 3,950 barrels of oil per day, flowing. Located on surface and subsurface geology. Extended production ¾ mile south.

Steamboat Butte.—Fremont County. Brinkerhoff Drilling Company's Tribal No. 1, Sec. 9, T. 3 N., R. 1 W. Completed April 13, 1947, at 6,923 feet in Tensleep sand for 912 barrels of oil per day, pumping and flowing. Location based on seismic work and subsurface geology. Extended production ¾ mile southeast.

Horse Creek.—Laramie County. General Petroleum Corporation's No. 32-6-P, Sec. 6, T. 16 N., R. 68 W. Completed October 5, 1947, at 5,591 feet in Muddy sand for 92 barrels of oil per day, pumping. Located on subsurface geology and seismic work, extends production ¾ mile southwest.

Elk Basin.—Park County. Stanolind Oil and Gas Company's Unit No. 95-M, Sec. 31, T. 58 N., R. 99 W. Completed October 31, 1947, at 5,875 feet in Madison limestone, total depth, 5,941 feet, for 38 barrels of oil per hour, flowing. Located on surface and subsurface geology extends production 2½ miles southeast.

Church Buttes.—Sweetwater County. Mountain Fuel Company's Unit No. 2, Sec. 22, T. 17 N., R. 112 W. Completed September 24, 1947, at 12,651 feet in Dakota sand, total depth, 12,692 feet, for 14,800,000 cubic feet of gas per day and 236 gallons condensate per day. Located on seismic work, extends production 4½ miles northeast.

East Hiawatha.—Sweetwater County. Mountain Fuel Company's Wilson No. 3, Sec. 17, T. 12 N., R. 99 W. Completed September 7, 1947, at 3,712 feet in Wasatch formation, total depth, 4,375 feet, for 1,550,000 cubic feet of gas per day. Located on surface, subsurface geology, and seismic work, extends production 1½ miles east.

Table Rock.—Sweetwater County. Texas Company's Unit No. 3, Sec. 2, T. 18 N., R. 98 W. Completed August 13, 1947, at 3,381 feet in Fort Union formation, total depth, 3,950 feet, for 5,400,000 cubic feet of gas per day. Located on surface geology. Extends field ¾ mile southwest.

Worland Dome.—Washakie County. Pure Oil Company's Unit No. 2, Sec. 12, T. 48 N., R. 92½ W. Completed January 25, 1947, at 10,400 feet in Phosphoria formation, total depth, 10,721 feet, for 78 barrels of oil per day, flowing. Located on seismic work. Extends production 1¾ miles northwest.

Pure Oil Company's Unit No. 3, Sec. 17, T. 48 N., R. 92 W. Completed September 9, 1947, at 10,151 feet in Phosphoria formation for 366 barrels of oil per day, flowing, and 600,000 cubic feet of gas per day. Located on seismic work. Extends production 1¼ miles southeast.

Mush Creek.—Weston County. Mush Creek Production Company's Rogers No. 2, Sec. 10, T. 44., R. 63 W. Completed February 19, 1947, in Newcastle sand for 300 barrels

of oil per day, flowing. Located on trend and extends productive area 2½ miles northwest.

Platte Valley Oil Company's Government No. 3, Sec. 11, T. 44 N., R. 63 W. Completed July 14, 1947, at 3,828 feet in Newcastle sand for 60 barrels of oil per day, flowing. Located on trend. Extends productive area 1¼ miles east.

Morton Drilling Company's Sedgwick No. 1, Sec. 17, T. 44 N., R. 63 W. Completed August 31, 1947, at 4,165 feet in Newcastle sand for 150 barrels of oil per day, flowing. Located on trend. This well extends production 1½ miles west.

Phillips Petroleum Company's Torgeson No. 1, Sec. 7, T. 44 N., R. 63 W. Completed November 4, 1947, at 4,335 feet in Newcastle sand for 23 barrels of oil per 16 hours, pumping. Located on trend. This well extended production 1¼ miles west.

Ant Hills.—Niobrara County. Arrow Petroleum Company's Wasserburger No. 1, Sec. 1, T. 37 N., R. 63 W. Completed August 18, 1947, at 4,826 feet in Muddy sand for 104 barrels of oil per day, pumping. Location based on surface geology. Extended production 4 miles north.

WYOMING

SUCCESSFUL DEEPER-POOL TESTS

Quealy Dome.—Albany County. California Company's Holst No. 2, Sec. 13, T. 17 N., R. 77 W. Completed March 2, 1947, at 5,510 feet in Casper formation for 278 barrels of oil per day, pumping. Water in lower part of Casper formation. Located on surface and subsurface geology.

Torchlight Dome.—Bighorn County. Stanolind Oil and Gas Company's Stano-Orchard No. 1, Sec. 24, T. 51 N., R. 93 W. Completed October 31, 1947, in Tensleep sand at 3,140 feet for 68 barrels of oil per day, flowing with 8 per cent bottom sediment and water. Located on surface geology.

Hatfield Dome.—Carbon County. Ohio Oil Company's Government No. 1, Sec. 2, T. 19 N., R. 88 W. Completed October 7, 1947, in Tensleep sand for 300 barrels of oil per day, pumping, at 6,015 feet. Located on surface geology.

South Spring Creek.—Park County. Texas Company's Unit No. 3, Sec. 13, T. 4 N., R. 102 W. Completed February 20, 1947, in Madison limestone at 4,579 feet for 400 barrels of oil per day, pumping. Located on surface and subsurface geology.

Hidden Dome.—Washakie County. Ohio Oil Company's No. O.P.C. 2, Sec. 31, T. 48 N., R. 90 W. Completed May 16, 1947, in Tensleep sand at 7,926 feet for 116 barrels of oil per day, pumping. Located on surface and subsurface geology.

In addition to the wells listed that were successful in developing new production, there were 34 dry wildcat wells and 19 dry outpost wells drilled during 1947 in Wyoming.

UTAH

There were eight dry wildcat wells drilled in Utah during 1947. Four of these wells were located on surface geology, two on seismic work, and two on non-technical information.

SOUTH DAKOTA

South Dakota had three well completions in 1947. Two development wells, one of which was dry and one gas producer, and one dry wildcat well.

EXPLORATION

Exploration in the Rocky Mountain region in 1947 was the highest on record. In addition to the surface parties and office studies, so far as can be ascertained,

TABLE II

EXPLORATORY WELLS DRILLED IN ROCKY MOUNTAINS IN 1947

	Successful Wildcats	*Unsuccessful Wildcats*	*Outposts Successful*	*Outposts Dry*	*Deep-Pool Tests Successful*
Colorado	3	35	2	3	0
Wyoming	8	34	15	19	5
Montana	5	18	8	13	0
Utah	0	8	0	0	0
South Dakota	0	1	0	0	0
	16	96	25	35	5

	Deep-Pool Tests Dry	*Shallow-Pool Tests Successful*	*Development Wells*	*Total Wells*	
				1947	*1946*
Colorado	0	0	158	201	278
Wyoming	3	1	200	285	258
Montana	3	2	267	317	391
Utah	1	0	0	9	24
South Dakota	0	0	2	3	13
	7	3	627	815	964

1947 was the first time that photogeology played a dominant part in petroleum exploration in this part of the United States. Exact figures on the number of square miles worked by this method are not obtainable, but reliable information indicates the figure is in excess of 110,000 square miles covered photogeologically in the Rocky Mountain region during the year.

The positive results of photogeological work done in this region in 1947 can not be evaluated at this time. However, it is known that many new and unmapped structures were discovered by this method in addition to new areas of potential structural significance.

GEOPHYSICS

The maximum number of seismograph and gravity parties operating in the Rocky Mountain region during 1947 are shown in Table III.

TABLE III

	Seismograph	*Gravity*
Colorado	14	17
Montana	9	1
North Dakota	1	0
Utah	6	4
Wyoming	50	24

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 893-896, 1 FIG., 1 TABLE

DEVELOPMENTS IN NEW YORK IN 1947[1]

EDWARD R. McAUSLAN[2]
Wellsville, New York

ABSTRACT

Twenty-seven wells were completed or drilling by the end of 1947 in the Oriskany gas sand area as compared with 26 wells in 1946. There was one new discovery. Five new wells which produced gas had a combined open flow of 23,797 MCF. Gas produced amounted to 2,388,312 MCF. Figure 1 shows the Oriskany fields and drilling during 1947. Table 1 gives the records of Oriskany drilling. Twenty-three wells were drilled to the Medina with a combined open flow from the 13 producers of 5,900 MCF. In the oil fields there were 1,700 completions, a decrease of 39 from 1946, and the daily average production decreased from 12,828 barrels in 1946 to 12,349 barrels in 1947. There were only a few wildcat oil wells drilled and all failed to find oil in commercial quantity.

Oriskany gas area (*Allegany, Steuben, and Tompkins counties*).—At the end of the year 1947 in the Oriskany gas sand area of New York state there were 21 wells completed and 5 drilling as compared with 21 wells completed and 5 drilling in 1946. These wells included 5 holes which were successful in finding commercial gas, 8 wells which produced salt water, 6 dry holes, 2 wells which were abandoned before reaching the Oriskany, and 5 wells which were drilling at the close of the year. Of the producers, 3 were in the proved Independence field, mapped as D in Figure 1; 1 producing well, also mapped as D in Figure 1, was an extension; and 1 wildcat, mapped as 8 in Figure 1, in the Bath area, was moderately successful. The combined open flow of new wells, drilled in 1947 was 23,797 MCF, while total open flow of producers found in 1946 amounted to only 9,927 MCF.

The total footage drilled amounted to 85,860 as against 97,000 feet in 1946. The average total depth of completions was 4,252 feet.

Oriskany gas production for the year totaled 2,388,312 MCF, an increase of 157,312 MCF from the previous year.

Medina sand area (*Cattaraugus, Chautauqua, and Erie counties*).—There were 22 storage wells drilled in the Medina fields during 1947. One wildcat Medina test failed to find commercial gas. Figures on the total Medina completions are unknown as there are no scouting facilities available for the Medina areas. The total of 23 known completions can be compared favorably with the 15 wells finished during 1946. No thing new was produced from the Medina, but the combined open flow of new wells in the storage fields amounted to 5,900 MCF as compared with 2,000 MCF in 1946.

Oil-producing area (*Allegany, Steuben, and Cattaraugus counties*).—In the secondary-recovery operations of the Allegany field and the New York part of the Bradford field there were 1,700 well completions, of which about 920 were oil wells and 780 were water-input wells. This represents a decrease of 39 wells from 1946. The total oil production reached a figure of 4,507,813 barrels, a daily

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, March 6, 1948.

[2] Geologist, Empire Gas and Fuel Company, Ltd.

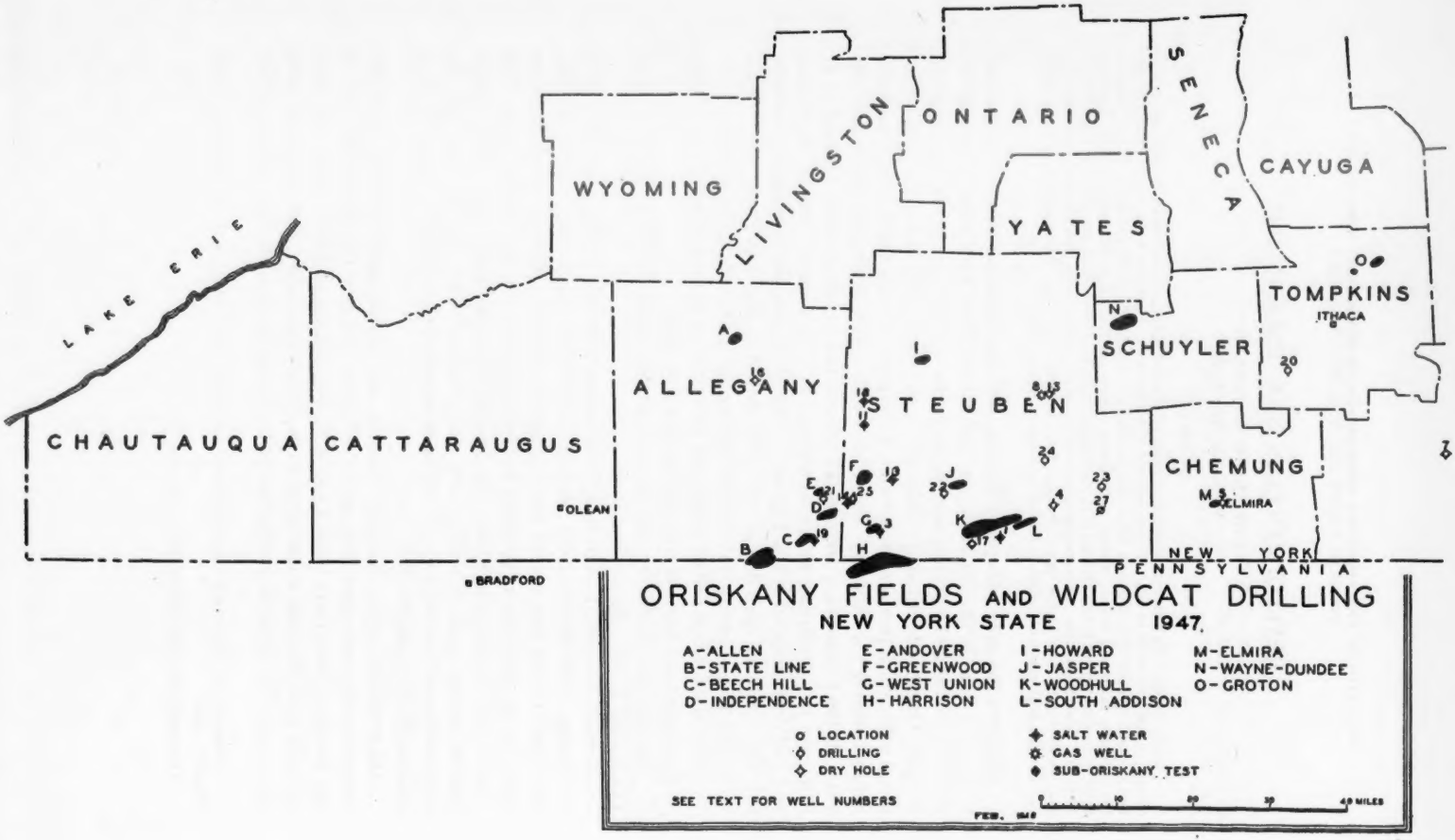

LAKE ERIE
WYOMING
LIVINGSTON
ONTARIO
SENECA
CAYUGA
YATES
TOMPKINS
ITHACA
SCHUYLER
ALLEGANY
STEUBEN
CHAUTAUQUA
CATTARAUGUS
CHEMUNG
ELMIRA
OLEAN
BRADFORD
NEW YORK
PENNSYLVANIA
ORISKANY FIELDS AND WILDCAT DRILLING
NEW YORK STATE 1947
A-ALLEN
B-STATE LINE
C-BEECH HILL
D-INDEPENDENCE
E-ANDOVER
F-GREENWOOD
G-WEST UNION
H-HARRISON
I-HOWARD
J-JASPER
K-WOODHULL
L-SOUTH ADDISON
M-ELMIRA
N-WAYNE-DUNDEE
O-GROTON
LOCATION
DRILLING
DRY HOLE
SALT WATER
GAS WELL
SUB-ORISKANY TEST
SEE TEXT FOR WELL NUMBERS
0 10 20 30 40 MILES

FIG. 1

TABLE I

ORISKANY WELL DEVELOPMENTS IN NEW YORK STATE IN 1947
(Elevations and depths are in feet)

County	*Township*	*Operator*	*Farm*	*Well Map No.*	*Elevation*	*Tully*	*Onondaga*	*Oriskany*	*Total Depth*	*Result*	*Class*
Allegany	Andover	Empire	Clark 1	21	2,137.8 DF	Drilling					WC
	Andover	Empire	Crandall 2	*	2,316.6 DF	4,260–4,312	4,880–4,926	4,926	4,928	3,300 M	Proved
	Angelica	Christman	Alleg. Co. 1	16	2,182 G	3,423	3,986–4,080	4,080–4,086	4,102	Dry	WC
	Independence	Empire	Barney 1	*	1,951.5 DF	3,958–3,998	4,556–4,605	4,605	4,615	6,000 M	Proved
	Independence	Empire	Bassett 2	*	2,066 DF	4,122–4,167	4,735–4,780	4,780	4,788	1,100 M	Ext
	Independence	Empire	Graves 1	19	2,182.6 DF	4,260–4,308	5,146–5,213	5,213	5,219	SW	Ext
	Independence	Empire	Lewis 2	*	2,083.3 DF	4,074–4,114	4,684–4,728	4,728	4,731	13,000 M	Proved
	Independence	Empire	Potter 2	*	2,284 DF	4,346–4,394	4,979–5,026	5,026	5,035	SW	WC
Chemung	Elmira	AGC	Gregg 1	5	1,310 G	1,950	3,125–3,179	3,179–3,200	3,216	12 M	Proved
Steuben	Addison	Landie	Ackerson	4	1,600 Est	3,430–3,480	4,291–4,321	4,321–4,353	4,364	Dry	WC
	Bath	App	Faucett 1	15	1,831 DF	2,503	3,338–3,358	3,358–3,375	3,380	10 M	OP
	Bath	App	State of N.Y.	8	1,369 G	2,042–2,082	2,869–2,895	2,895	2,905	375 M	WC
	Erwin	NYSNG	Keegan 1	23	1,665 G	Drilling					WC
	Erwin	Spencer HD	Pock	27	1,635 DF	Abandoned above Tully					WC
	Greenwood	Empire	Cartwright 1	14	2,247 DF	4,208–4,258	4,852–4,898	4,898	4,901	SW	WC
	Greenwood	Empire	Rogers 1	25	2,187 G	Drilling					WC
	Hartsville	App	Wells 1	11	1,392 DF	2,920–2,961	3,572–3,622	3,622	3,632	SW	WC
	Hornellsville	Empire & App	Falzarano 1	18	1,376 DF	2,627–2,672	3,272–3,316	3,316	3,330	SW	WC
	Jasper	App	Quick 1	13	1,548 DF	3,350–3,395	4,014–4,040	4,040	4,052	SW—some gas	WC
	Jasper	NYSNG	House 1	22	1,722	Drilling					OP
	Thurston	Evjen	Knowles 1	24	1,583.5 DF	Drilling					WC
	West Union	Kane	Johnson 1	3		4,550–4,615	5,225–5,255	5,255–5,284	5,258	SW—some gas	NWC
	Woodhull	Cunningham	Holt 1	1	1,607	3,668–3,704	4,471–4,503	4,503–4,518	4,525	SW	WC
	Woodhull	NYSNG	Grist 1	17	1,932 G	4,145–4,195	4,948–4,987	4,987–4,997	5,080	Dry	WC
Tioga	Spencer	NYSNG	Stevens 1	7	965 DF	1,544–1,624	2,994–3,046	3,046–3,109	3,150	Dry	WC
Tompkins	Newfield	Crossmore	Crossmore 1	20	680 DF	Abandoned above Tully					WC

Key to operators: Empire—Empire Gas & Fuel Company, Ltd.
App—Appalachian Development Corporation
AGC—Allegany Gas Corporation
NYSNG—New York State Natural Gas Corporation
Spencer HD—Spencer Hill Development Corporation
* On map as symbol D

Key to result: M—1,000 cubic feet of gas
SW—Salt water
Key to class: WC—Wildcat
Ext—Extension
NWC—Near-field wildcat
OP—Outpost

average production of 12,349 barrels. The daily average decreased from 1946 by 479 barrels. The average price paid for the crude oil increased from $3.825 in 1946 to $4.212 in 1947.

Reports were encouraging about the possibilities of secondary recovery in the small Corbin Hill oil pool near Belmont, Allegany County. The sand shows very favorable characteristics for water-flooding operations.

Wildcat oil wells.—No new oil pools have been discovered by wildcat drilling in 1947, possibly because of the slight amount of activity. In the Town of Friendship, Allegany County, 2 unsuccessful wells were drilled with the hope of extending the old Nile pool. Failures were also registered in Granger Township, Allegany County, in Great Valley and Machias townships, Cattaraugus County, and in Hartsville Township, Steuben County.

Some geological work was done in the state in 1947, but as far as is known there was no geophysical exploration of any importance.

The New York State Science Service established an office in Wellsville early in the year with a geologist in residence, to aid producers in geological and production problems. At present the office is engaged in gathering well records, well cuttings, and other pertinent data.

Considerable constructive thinking has been done in the past year regarding possibilities of oil and gas production in the lower Paleozoic section with particular reference to Ordovician and Cambrian formations.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 897-906, 1 FIG., 3 TABLES

DEVELOPMENTS IN PENNSYLVANIA IN 1947[1]

CHARLES R. FETTKE[2]
Pittsburgh, Pennsylvania

ABSTRACT

A decline of 11 per cent occurred in the total number of wells completed in the shallow-sand territory of western Pennsylvania (Upper Devonian or higher) during 1947, as compared with 1946. Sixteen new gas pools were discovered, none of which, however, gives indications that it will be of very significant size. No new oil pools were discovered. In the Pennsylvania part of the Bradford oil field, which was the most active area, 1840 new wells were completed, as compared with 2153 in 1946. About half of these were water-intake wells. The Bradford field accounted for 82 per cent of the total oil production in Pennsylvania during 1947. The average daily production in the state in 1947 was 35,242 barrels, as compared with 36,383 barrels in 1946.

Twenty-eight deep wells (Onondaga or deeper) were completed in 1947. Ten of these were gas wells, 6 were drilled for gas storage, and 12 were dry holes. One of the gas wells, located in Wayne Township, Erie County, opened a new Medina sand pool.

A decline in drilling activity occurred in the shallow-sand territory of western Pennsylvania (Upper Devonian or higher) during 1947. In all, 3,247 wells were completed, as compared with 3,631 in 1946, a decrease of 11 per cent. Of these, 502 were gas wells, 208 were oil wells, 178 were dry holes, 26 were drilled for gas storage, and 2,333 were drilled in connection with secondary-recovery oil operations. Twenty-eight deep wells (Middle Devonian or deeper) were completed in 1947. Ten of these were gas wells, 6 were drilled for gas storage, and 12 were dry holes. One of the gas wells opened a new small pool.

SHALLOW-SAND DEVELOPMENTS

Shallow-sand well completions in western Pennsylvania, exclusive of those drilled in connection with underground gas storage and secondary-recovery oil operations, are shown in Table I. During 1947, 888 wells were drilled, of which 57 per cent were gas wells, 23 per cent were oil wells, and 20 per cent were dry holes. The 502 new gas wells had a total initial open-flow capacity of 71,667,000 cubic feet per day, as compared with the total initial open-flow capacity of 128,811,000 cubic feet of the 592 new gas wells completed in 1946. The 208 new oil wells had a total initial production of 518 barrels per day, as compared with the total initial production of 1,680 barrels of the 203 oil wells completed in 1946.

Sixteen new small gas pools were discovered, as follows: one in Millstone Township, Elk County; two in Jenks Township, Forest County; one each in Conemaugh, East Wheatfield, Montgomery, and White townships, Indiana

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, March 12, 1948. Published by permission of the director of the Pennsylvania Topographic and Geologic Survey.

[2] Professor of geology, Carnegie Institute of Technology, and co-operating geologist, Pennsylvania Topographic and Geologic Survey. In connection with the preparation of this review, the writer wishes to acknowledge the co-operation of G. G. Bauer, George J. Donaldson, Jr., Jack Gaddess, George C. Grow, Jr., William S. Lytle, D. T. Secor, and Wilbur H. Seifert, who contributed part of the data.

County; one in Snyder Township, Jefferson County; one each in Annin, Keating, Liberty, and Sergeant townships, and two in Eldred Township, McKean County; and one each in Hebron and Oswayo townships, Potter County. The more important gas developments occurred in Armstrong, Indiana, Jefferson, Washington, and Westmoreland counties. Two wells were drilled in Cambria Township, Cambria County, to test the Upper Devonian sands in a part of the northern Allegheny plateau east of the shallow-sand gas belt that has been but little explored in the past. Both wells were dry. One of them was drilled to a depth of

TABLE I

SHALLOW-SAND WELL COMPLETIONS IN PENNSYLVANIA IN 1947*

County	Completions		Gas			Oil			Dry	
	Number of Wells	Average Total Depth (Feet)	Number of Wells	Average Initial Open-Flow (M. Cu. Ft. Per Day)	Average Total Depth (Feet)	Number of Wells	Average Initial Production (Bbls. Per Day)	Average Total Depth (Feet)	Number of Wells	Average Total Depth (Feet)
Allegheny	12	2,940	4	570	2,622	0	—	—	8	3,099
Armstrong	112	3,016	102	99	3,040	0	—	—	10	2,774
Butler	39	1,981	16	108	2,404	15	3.5	1,646	8	1,766
Cambria	2	4,670	0	—	—	0	—	—	2	4,670
Cameron	1	3,187	—	—	—	0	—	—	1	3,187
Clarion	40	2,477	37	52	2,461	0	—	—	3	2,674
Clearfield	11	3,175	4	75	3,180	0	—	—	7	3,172
Elk	32	2,378	21	180	2,331	0	—	—	11	2,468
Fayette	33	2,547	25	189	2,542	0	—	—	8	2,843
Forest	30	2,048	14	47	2,009	0	—	—	16	2,082
Greene	20	2,925	11	86	2,986	1	6	3,343	8	2,789
Indiana	48	3,034	38	232	2,980	0	—	—	10	3,283
Jefferson	100	2,776	66	188	2,626	0	—	—	34	3,067
McKean	191	1,914	58	53	2,170	119	3	1,742	14	2,317
Mercer	8	913	3	40	650	3	1	650	2	1,700
Potter	38	1,900	32	42	1,840	1	2	1,700	5	2,312
Tioga	2	1,880	0	—	—	0	—	—	2	1,880
Venango	13	1,978	10	37	2,031	0	—	—	3	1,801
Warren	65	950	0	—	—	65	1	950	0	—
Washington	56	2,415	35	303	2,282	4	12	2,297	17	2,718
Westmoreland	35	2,917	26	328	2,875	0	—	—	9	3,037
Total	888	2,335	502	143	2,554	208	2.5	1,490	178	2,707

* Does not include wells drilled in connection with underground gas storage or secondary-recovery oil operations.

5812 feet and passed through the Allegrippis sandstone, in the lower part of the Chemung formation of the Upper Devonian, recognized on the outcrop along the Allegheny Front. This sand probably occurs well below that of the deepest producing Upper Devonian sands of western Pennsylvania. Twelve wells, averaging 2019 feet in depth, were drilled for underground gas storage in Allegheny County; four, averaging 2146 feet, in Greene County; three, averaging 1375 feet, in Jefferson County, and seven, averaging 2547 feet, in Washington County. Forty-seven shallow-sand wells were deepened with the results shown in Table II.

In the Bradford oil field, which includes the Bradford, Guffey, and Burning Well pools, 2140 new wells were drilled, about half of which were water-intake wells, as compared with 2503 in 1946, a decrease of 15 per cent. Oil production in this field, about 86 per cent of whose area is in Pennsylvania, decreased from a

daily average of 32,209 barrels in 1946 to 31,814 barrels in 1947, or 1.2 per cent. Of the new wells, 1,840 were located in the Pennyslvania part of the field, and this part contributed 29,026 barrels of the daily average production. This represented 82 per cent of the total oil production of the state.

In the Kane-Clarendon area of southwestern McKean County and eastern Warren County, 216 wells were completed in 1947, mostly in connection with water-flooding projects in the Clarendon pool of east-central Warren County. In the Venango district of northern Venango County and southwestern Warren County, 124 air-intake and 153 oil wells were drilled in 1947, as compared with 127 and 205, respectively, in 1946, a decrease of 16 per cent. Oil production in the

TABLE II

SHALLOW-SAND WELLS DEEPENED IN 1947

County	Total		Gas			Oil			Dry	
	Number of Wells	Average Amount Depth (Feet)	Number of Wells	Average Initial Open-Flow M. Cu. Ft. Per Day	Average Amount Depth (Feet)	Number of Wells	Average Initial Production (Bbls. Per Day)	Average Amount Depth (Feet)	Number of Wells	Average Amount Depth (Feet)
Armstrong	13	1,369	9	55	1,436	0	—	—	4	1,214
Butler	6	1,041	5	29	1,076	0	—	—	1	865
Fayette	2	1,164	1	353	617	0	—	—	1	1,711
Greene	6	855	5	112	801	1	8	1,128	0	—
Indiana	3	1,807	2	177	1,640	0	—	—	1	2,140
Jefferson	1	849	1	391	849	0	—	—	0	—
Washington	15	919	6	149	1,290	4	30	842	5	534
Westmoreland	1	860	1	33	860	0	—	—	0	—
Total	47	1,115	30	107	1,188	5	25	899	12	1,020

middle and southwestern districts of Pennsylvania decreased from a daily average of 6,931 barrels in 1946 to 6,217 barrels in 1947, or 10 per cent.

The Coryville oil pool in the northeastern part of McKean County, discovered in 1945, continued to be the scene of active development. About 100 oil wells were completed in 1947, but these did not appreciably extend the limits of the pool. The initial production of the wells ranged from 1 to 15 barrels of oil per day, the average being about 3 barrels. Considerable drilling activity occurred in Sugar Grove Township in the north-central part of Warren County during 1947. The presence of some oil in the Glade sand in this area has been known for some time. Current favorable oil prices have stimulated interest in the area. About 65 wells with average initial productions of not much more than one barrel of oil per day were completed at an average depth of 950 feet. The Glade sand in the area is fine-grained and tightly cemented. Its permeability is low. After a heavy shot, the wells produce 2- 10 barrels of oil per day for a short period but within a month decline to $\frac{1}{4}$-$\frac{1}{2}$ barrel per day. No new oil pools were discovered in Pennsylvania during 1947.

TABLE III

DEEP TESTS COMPLETED AND DRILLING IN WESTERN PENNSYLVANIA IN 1947
(Elevations and depths are in feet)

Map No.	*County*	*Township*	*Well*	*Company*	*Elevation Above Sea-Level*	*Tully*	*Onondaga*
1	Clearfield	Bell	Alice Irwin 10	F. C. Deemer	1,964	6,685–6,865	7,424–7,503
2	Crawford	Beaver	Wilbur J. Bittel 1	Appalachian Dev. Corp.	1,036		2,148–2,405
3	Crawford	East Fallowfield	Ellen Calvin 2	Sylvania Corp.	1,343	3,083–	3,235–3,430
4	Crawford	Richman	Harry F. White 1	Bean and White	1,270	2,814–2,898	3,026–3,208
5	Erie	Greenfield	Lloyd Jones 1	Appalachian Dev. Corp.	1,409		2,355–2,590
6	Erie	Greene	E. W. Downing 1	Appalachian Dev. Corp.	1,406	2,070–2,157	2,301–2,566
7	Erie	Summit	Carl W. Held 1	Appalachian Dev. Corp.	1,149		2,039–2,280
8	Erie	Summit	H. G. Hull 1	Sylvania Corp.	1,200	1,860–1,964	2,084–2,329
9	Erie	Summit	A. F. Hugger 1	Sylvania Corp.	1,236	1,895–2,000	2,121–2,372
10	Erie	Summit	G. S. Gaber 1	Appalachian Dev. Corp.	1,250	1,908–2,018	2,142–2,396
11	Erie	Summit	Frank Buczkowski 1	Sylvania Corp.	1,124	1,768–1,877	2,000–2,252
12	Erie	Summit	Chester Fuhrman 1	Appalachian Dev. Corp.	1,194		2,089–2,329
13	Erie	Wayne	C. J. Follette 1	Pennsylvania Gas Co.	1,835	2,934–3,008	3,185–3,410
14	Erie	Wayne	John Kalika 1	Pennsylvania Gas Co.	1,854		3,199–3,396
15	Erie	Wayne	W. W. Stutzman 1	Pennsylvania Gas Co.	1,660	2,770–2,845	3,028–3,221
16	Erie	Wayne	C. J. Follette 2	Pennsylvania Gas Co.	1,774		
17	Fayette	Georges	William Hartman 1	Peoples Natural Gas Co.	2,354	6,560–6,638	7,089– Chert 7,184–7,533
18	Fayette	Georges	Jesse S. Eutsey 1	Manufacturers Light and Heat Co.	2,290	6,263–6,363	6,839– Chert 6,873–7,036
19	Fayette	Georges	Geo. W. Walters 2	Peoples Natural Gas Co.	2,454	6,944–	7,442– Chert 7,468–7,632
20	Fayette	Georges	Mary I. Smith et al. 2	New Penn. Dev. Corp. et al.	2,390	6,504–6,600	7,133– Chert 7,147–7,320
21	Fayette	Georges	A. J. Opperman 1	Orville Eberly	2,358	6,390–6,468	Chert 6,943–
22	Fayette	Georges	Wm. Barton 8	Manufacturers Light and Heat Co.	2,598		
23	Fayette	Springhill	George Steve 1	Manufacturers Light and Heat Co.	2,542	7,353–	Chert 8,008–
24	Fayette	Springhill	Allie May Martin 1	Peoples Natural Gas Co.	2,367	7,078–7,180	7,634– Chert 7,657

Oriskany	*Lockport*	*Medina*	*Total Depth*	*Date Completed*	*Results*
7,503–7,505					Drilling at 8,027 ft.
2,405–2,413					16,000 cu. ft. gas 2,407; 6 bbl. s.w. per hr. 2,408; black water 3,225–3,240. Shut down, 3,327
3,430–3,448					2,000 ft. s.w. in Oriskany. Shut down at 3,453
absent					3,000 ft. black water at 4,100. Shut down at 4,113
2,590–2,597			2,622	11- 7-47	1,500 ft. s.w. at 2,610–2,622
2,566–2,573			2,587	5-29-47	Show of gas and oil at 2,572 ft.
2,280–2,300			2,302	1- 7-47	1,200 ft. s.w. in 3 hrs. from Oriskany
2,329–			2,337	1-17-47	1,436,000 cu. ft. gas at 2,332–2,337 ft. 800 pounds R.P. 24 hrs.
2,373–			2,380	3-13-47	254,000 cu. ft. gas at 2,374–2,378 ft. 615 pounds R.P. 24 hrs.
2,396–			2,399	4- 4-47	S.w. in Oriskany at 2,398 ft.
2,252–2,257			2,325	4-21-47	Show of gas at 2,254 ft. 7 gal. s.w. per hr. 2,257–2,260 Show of gas at 2,313 ft. 31 gal. s.w. per hr. 2,325
2,329–2,340					5,000 cu. ft. gas and s.w. in Oriskany Drilling at 3,178 ft.
absent	4,167–4,174	Red 4,301–4,434 White 4,434–4,456	4,584	4-29-47	6,000 cu. ft. gas and 700 gallons s.w. at 4,168 ft. 900,000 cu. ft. gas, 4,539–4,544 after shot. 1,155 pounds R.P. 24 hrs.
absent	4,182–4,190	Red 4,413–4,450 White 4,450–4,460	4,591	10-10-47	200 ft. black water at 4,181–4,182 ft. 2,000 cu. ft. gas, 4,186 ft. 20,000 cu. ft. gas, 4,549; 26,000 cu. ft. after shot. Abandoned
absent	3,988–3,997	Red 4,233–4,278 White 4,278–4,390	4,452	10-25-47	16,000 cu. ft. gas at 3,987 ft.; black water, 3,988. 12,000 cu. ft. gas at 4,276 ft. Plugged and abandoned
					Drilling
7,533–7,636			7,636	5-19-47	6,187,000 cu. ft. gas at 7,589, 7,590, 7,622–7,627, and 7,636 ft. 1,720 pounds R.P. 72 hrs.
7,036–7,182			7,199	6-27-47	4,300,000 cu. ft. gas, 6,903–6,965 ft. 1,775 pounds R. P. 92 hrs.
7,632–7,706			8,312	8-21-47	151,000 cu. ft. gas at 6,539 ft. after shot. 2,575 pounds R. P. 28 days
7,320–					850,000 cu. ft. gas after shot 7,181–7,183 ft. Shut down 7,517
					1,300,000 cu. ft. gas at 6,949–6,950 ft. 1,460 pounds R. P. 50 hours. Shut down
					Drilling at 6,768 ft.
8,177–			8,788	1-23-47	Show of gas and s.w. at 8,052 ft. 130,000 cu. ft. gas after shot. Abandoned
7,835–7,902 8,102–					Crossed fault near base Oriskany. Gas pocket, 8,211. Drilling at 8,253 ft.

Map No.	County	Township	Well	Company	Elevation Above Sea-Level	Tully	Onondaga
25	Fayette	Springhill	Paul Dunham 2	New Penn. Dev. Corp. et al.	2,326	6,789–6,912	7,677–Chert 7,710–7,875
26	Fayette	Springhill	J. R. Smiley 1	Wm. E. Snee et al.	2,314	6,605–	
27	Fayette	Wharton	George Murray 1	Orville Eberly			
28	McKean	Lafayette	L. D. Wilson 18	South Penn. Oil Co.	1,545		
29	Potter	Abbott	Penn'a. State Lands 1	Allegany Gas Co.	1,941	5,478–5,531	6,245–
30	Potter	Allegany	Merle Scoville 1	Appalachian Dev. Corp.	2,213		
31	Potter	Bingham	G. L. Tarbox et al. 1	N. Y. State Natural Gas Co.	2,269	4,812–	5,462–
32	Potter	East Fork	Emporium Lumber Co. 10	Allegany Gas Co. et al.	1,915	5,445–5,523	6,186–6,194
33	Potter	East Fork	Emporium Lumber Co. 11	Allegany Gas Co. et al.	1,960	5,497–5,564	6,225–6,235
34	Potter	East Fork	Emporium Lumber Co. 12	Allegany Gas Co. et al.	1,984	5,568–5,636	6,325–6,330
35	Potter	East Fork	Emporium Lumber Co. 13	Allegany Gas Co. et al.	1,867		
36	Potter	Hebron	Milo Simpson 1	Appalachian Dev. Corp.	2,238	4,916–4,962	5,490–5,508
37	Potter	Sharon	Burt Dunshie 3	Allegany Gas Co.	1,915	4,315–4,343	
38	Potter	Wharton	Central Penn. Lumber Co. 5	Godfrey L. Cabot, Inc.	2,016	5,590–5,660	6,317–6,386
39	Potter	Wharton	C. R. Peters 1	Godfrey L. Cabot, Inc.	1,908	5,484–5,564	6,208–6,218
40	Potter	Wharton	State of Pennsylvania 1	Godfrey L. Cabot, Inc.	2,098	5,669–	6,329–6,340
41	Potter	Wharton	State of Pennsylvania 2	Godfrey L. Cabot, Inc.	2,120		
42	Somerset	Shade	R. F. Grove 1	Peoples Natural Gas Co.	2,343		
43	Tioga	Farmington	L. B. Palmer 3	North Penn. Gas Co.	1,764	3,035–3,098	3,959–3,978
44	Tioga	Farmington	Charles Thomas 2	N. Y. State Natural Gas Co.	1,628	3,010–	3,930–3,965
45	Tioga	Jackson	T. V. Turnbull 1	Allegany Gas Co.	1,807	3,368–3,432	4,397–4,429
46	Tioga	Jackson	C. W. Greenwalt 1	N. Y. State Natural Gas Co. and Allegany Gas Co.	1,828		
47	Tioga	Lawrence	George Colegrove 1	N. Y. State Natural Gas Co.	1,386	2,732–2,793	3,659–3,687
48	Tioga	Lawrence	George Colegrove 2	N. Y. State Natural Gas Co.	1,612	2,952–3,027	3,870–3,901
49	Tioga	Lawrence	Dean Colegrove 2	N. Y. State Natural Gas Co.	1,681	3,084–3,155	4,010–4,046
50	Tioga	Lawrence	Farr-Mather et al. 4	N. Y. State Natural Gas Co.	1,524	2,886–2,950	3,808–3,842
51	Tioga	Lawrence	Clarence Cooley 2	N. Y. State Natural Gas Co.	1,720		
52	Warren	Sugar Grove	Anderson 1	T. M. Pettigrew et al.	1,360	2,833–2,859	3,046–3,183

Orishany	*Lockport*	*Medina*	*Total Depth*	*Date Completed*	*Results*
					Shut down at 7,965 ft.
					Drilling at 6,907 ft.
					170,000 cu. ft. gas at 1,880–1,896 ft. Shut down 3,021
					Drilling at 1,738 ft.
					Drilling at 6,324 ft.
					Drilling at 3,250 ft.
5,500–5,532			5,538	10- 4-47	4 bailers s.w. per hr., 5,506 ft.
6,194–			6,212	2-28-47	1,517,000 cu. ft. gas after shot, 6,201–6,208 ft.
Cap rock 6,235–6,238 Sand– 6,238			6,263	11- 3-47	300,000 cu. ft. gas after shot, 6,241–6,253 ft.
Cap Rock 6,330–6,334 Sand 6,334–6,379			6,400	10- 7-47	33,000 cu. ft. gas after shot, 6,334–6,347 ft. Show s.w., 6,356–6,360
					Drilling at 3,825 ft.
5,508–5,518			5,521	10-20-47	Dry
					Drilling
6,386–			6,448	12-30-47	Dry
6,218–			6,230	12- 5-47	641,000 cu. ft. gas, 6,223–6,228 ft. 3,300 pounds R. P. 24 hrs.
6,340–					4,700,000 cu. ft. gas at 6,346 ft. 3,600 pounds R. P. 2 hrs. Shut down at 6,346
					Drilling at 5,200 ft.
					Drilling at 5,200 ft.
3,978–			3,988	11- 8-47	Gas storage well
3,965–			3,998	12-26-47	Gas storage well
4,429–4,468			4,487	10-14-47	Show of gas, 4,434 ft. 15 gallons s.w. per hr., 4,436 ft.
					Drilling
3,687–			3,702	1-11-47	Gas storage well
3,901–			3,931	5-23-47	Gas storage well
4,046–			4,070	9- 5-47	Gas storage well
3,842–			3,860	11-21-47	Gas storage well
					Drilling at 550 ft.
absent		Red 4,220–4,295 White 4,295–4,410	4,440	5-29-47	Show of gas and oil at 4,222 ft. Dry

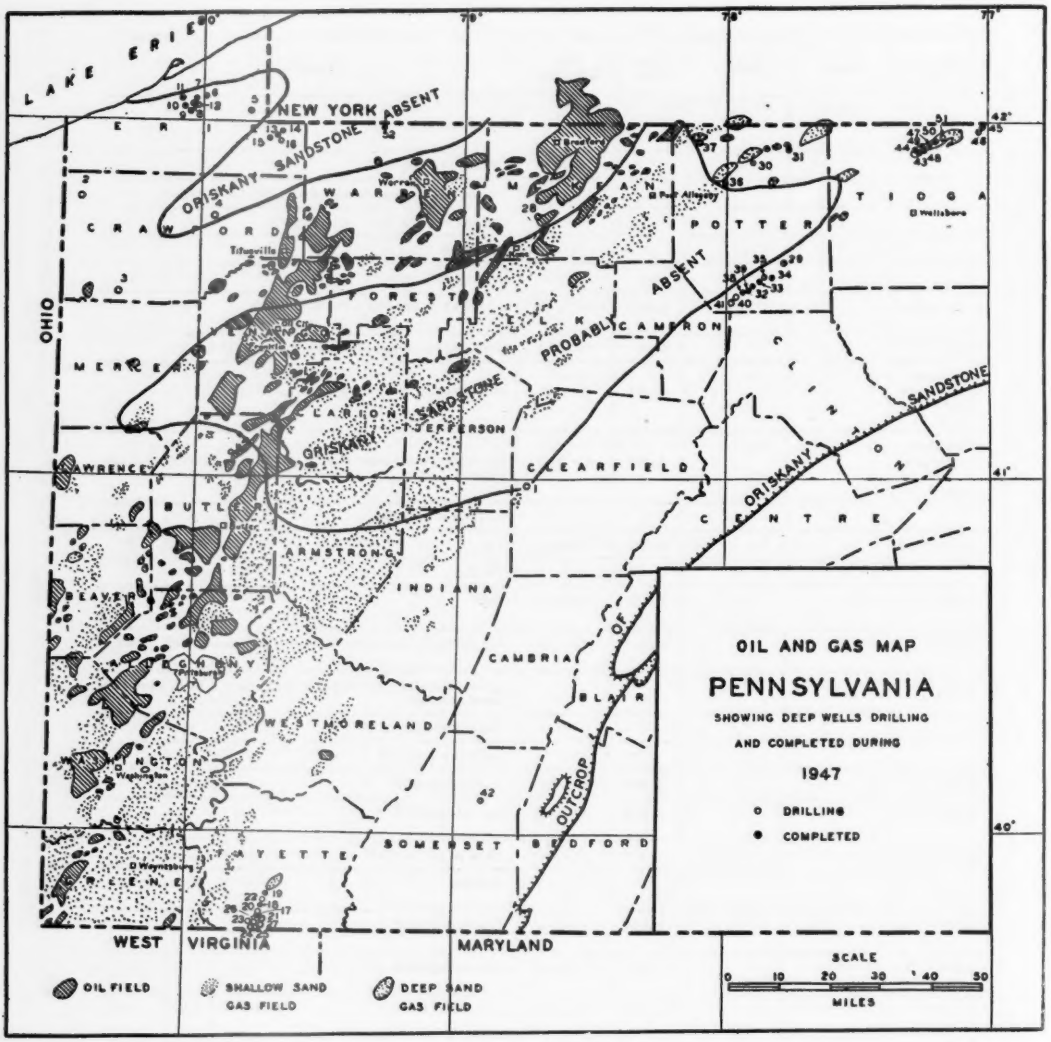

LAKE ERIE
NEW YORK ABSENT
ORISKANY SANDSTONE ABSENT
OHIO
ERIE
WARREN
MCKEAN
TIOGA
CRAWFORD
POTTER
FOREST
ELK
PROBABLE
ABSENT
CAMERON
MERCER
CLARION
SANDSTONE
JEFFERSON
ORISKANY
SANDSTONE
LAWRENCE
CLEARFIELD
ORISKANY
BUTLER
CENTRE
ARMSTRONG
INDIANA
BEAVER
CAMBRIA
BLAIR
WESTMORELAND
OUTCROP
WASHINGTON
FAYETTE
SOMERSET
BEDFORD
GREENE
WEST VIRGINIA
MARYLAND
OIL AND GAS MAP
PENNSYLVANIA
SHOWING DEEP WELLS DRILLING
AND COMPLETED DURING
1947
DRILLING
COMPLETED
SCALE
0 10 20 30 40 50
MILES
OIL FIELD
SHALLOW SAND GAS FIELD
DEEP SAND GAS FIELD

FIG. 1

DEEP-SAND DEVELOPMENTS

The results of deep drilling in western Pennsylvania during 1947 are summarized in Table III. The locations of the wells are shown on the map in Figure 1. Of the 28 wells completed, 10 were gas wells, 6 were drilled for gas storage, and 12 were dry holes. One of the gas wells opened a new pool.

The C. J. Follette well No. 1 in Wayne Township, Erie County, 5 miles northwest of Corry, opened a new Medina sand gas pool. It is the best Medina sand well that has been completed in Pennsylvania thus far. Although several other wells in northwestern Pennsylvania encountered small amounts of gas in the Medina formation of the Lower Silurian, their production has been insignificant. Two wells completed during 1947 in the vicinity of the Follette well were dry. One of these was located 6,000 feet northeast of the Follette well and the other 4,500 feet southwest.

The Meade Oriskany sand gas pool in Summit Township, north-central Erie County, discovered in 1946, was of only small extent. Two additional producing wells were completed in it in 1947. Salt water was encountered in the sand on the west, north, and east sides of the pool and undoubtedly also limits production on the south or downdip side. The productive area includes about 200 acres.

Two more gas wells were completed in the Smith pool, the southernmost one of the three gas pools comprising the Summit field in Fayette County. One of these encountered the gas in the Onondaga chert and the other in the underlying Oriskany sandstone. The three wells now completed in the Smith pool define a narrow belt for a distance of about 3,000 feet along the Chestnut Ridge anticline. A small gas well was also completed at the north end of the Barton pool, the middle one of the three Summit pools.

Four additional gas wells were completed in the East Fork Oriskany sand pool in southern Potter County, the largest one of which had an initial open-flow capacity of 1½ million cubic feet of gas per day after it was shot. The pool now has been developed for a distance of 2 miles along the axis of the Marshlands anticline.

The G. L. Tarbox well No. 1 in Bingham Township, Potter County, represents an unsuccessful test of a detached fault block south of the Bingham Center Oriskany sand gas pool and the Milo Simpson well No. 1 in Hebron Township. Potter County, a similar unsuccessful test south of the Hebron Oriskany sand gas pool.

Six wells were completed in 1947 in the old Tioga Oriskany sand field in northern Tioga County for gas storage purposes. The T. V. Turnbull well No. 1 in Jackson Township, Tioga County, represents an unsuccessful test along the Sabinsville anticline, 5 miles east of the Tioga field.

BIBLIOGRAPHY

Two publications dealing with oil and gas were issued by the Pennsylvania Geological Survey during 1947.

1. "Oil and Gas Developments in the North Strabane Area, Washington County, Pennsylvania," by Chas. R. Fettke, Robert C. Stephenson, and E. M. Tignor, *Pennsylvania Geol. Survey*, 4th Ser., Bull. M 28. 62 pp., 2 pls., 10 figs.

The discovery of a new small Gordon sand oil pool in the North Strabane area in 1945 stimulated considerable drilling activity in the vicinity. The report covers the subsurface stratigraphy, character of the sands and mode of occurrence of the oil and gas. It brings out the kinds of possibilities that remain in the Upper Devonian and higher strata in the comparatively densely drilled areas of southwestern Pennsylvania.

2. "Geology and Mineral Resources of the Smickburg Quadrangle," by Marchant N. Shaffner, *Pennsylvania Geol. Survey*, 4th Ser., *Topographic and Geologic Atlas of Pennsylvania*, A 55. 252 pp., 11 pls., 103 figs., including 1 geologic, 1 structure and mineral resources, and 4 gas maps.

The Smicksburg Quadrangle is in the eastern part of the shallow-sand gas belt of western Pennsylvania about half-way between the north and south boundaries of the state. Thirty pages of the report deal with the natural gas resources of the quadrangle.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
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DEVELOPMENTS IN OHIO IN 1947[1]

J. R. LOCKETT[2]
Columbus, Ohio

ABSTRACT

In all, 1,442 holes were drilled in Ohio, of which 22 per cent produced oil, 42 per cent were gas wells, and 36 per cent were dry. Exploratory tests totaled 1,383, and 59 holes were drilled in areas used for gas storage. Of the total completions, 57 per cent tested the Clinton sand, and of these 31 per cent were dry. Interest in gas development centered principally in and near the city of Canton, Stark County. Activity in oil development was principally in the Clinton sand in Muskingum and Perry counties and in the Berea development in Meigs County. No important new fields were discovered and extensions conformed to normal expectancy. There was no deep exploration of interest.

Although drilling in Ohio was greatly curtailed because of the shortage of equipment, 1,442 tests were completed in the state during the year. Of the total completions 317, or 22 per cent, were oil wells, 639, or 42 per cent, were gas wells and 486, or 36 per cent, were dry. Natural gas was stored in the Clinton sand in 14 areas and in the Berea sand in one. Such projects accounted for 59 completions and of these 2 were dry. In all, 828 tests were drilled through the Clinton sand, which was 57 per cent of the total number of holes drilled in the state. Of these, 31 per cent were dry.

Stark County continued to be the center of interest in gas development where 185 gas wells, 1 oil well, and 24 dry holes were completed in and near the city of Canton. This entire field produces from the Clinton.

Activity in Clinton oil development centered principally in Muskingum and Perry counties. In Muskingum 60 oil wells, 41 gas wells, and 60 dry holes were completed and 44 oil wells, 50 gas wells, and 36 dry holes were completed in Perry County. This field produces from both the Clinton sand and a lower member called the Medina.

The greatest activity in shallow drilling was in Meigs County where 60 oil wells, 18 gas wells, and 24 dry holes were drilled to the Berea sand and shallower zones.

No important new fields were discovered and extensions conformed with normal expectations.

The only hole which reached the basal complex was the Ohio Oil Company's rotary test on the Virgil Jones unit in McArthur Township, Logan County. Crystalline rocks were encountered at 3,245 feet and the hole was abandoned at the depth of 3,361 feet.

Completions in Ohio during 1947 are given by counties and sands in Table I.

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, April 5, 1948.

[2] Ohio Fuel Gas Company.

TABLE I. OIL WELLS, GAS WELLS, AND DRY HOLES DRILLED IN OHIO IN 1947 BY COUNTIES AND SANDS

County	Shallow			Berea			Ohio Shale			Orishany			Newburg			Clinton			Trenton			Sub-Trenton			Total			Total All Sands
	Oil	Gas	Dry	Oil	Gas	Dry	Oil	Gas	Dry	Oil	Gas	Dry	Oil	Gas	Dry	Oil	Gas	Dry	Oil	Gas	Dry	Oil	Gas	Dry	Oil	Gas	Dry	
EXPLORATORY DRILLING																												
Ashland				21	4	9											14	20				1			21	18	30	69
Ashtabula																		1									1	1
Athens	13	2	10		2	5																			13	4	15	32
Auglaize																			4						4			4
Belmont		3	3	1		6																			1	3	9	13
Carroll				1	1																				1	1		2
Columbiana				2	8	5					3														2	8	8	18
Coshocton										2						5	1	8							5	3	8	16
Cuyahoga																	3	3								3	3	6
Darke																										2		2
Fairfield						2										1	2	2							1	2	4	7
Fulton																					2						2	2
Gallia																	2	1								2	1	3
Geauga													1					1									2	2
Guernsey				1	11	6				4	2														1	15	8	24
Hancock																				5						5		5
Harrison						1																					1	1
Hocking						2											1	6								1	8	9
Holmes					1												5	5								6	5	11
Huron						3																					3	3
Jackson		2				2												1								2	3	5
Jefferson		2		1	1	5																			1	3	5	9
Knox						2							3			2	9	9							2	12	11	25
Lake															1												1	1
Lawrence		1															3	4								4	4	8
Licking				9		5	19	4								7	2	1							16	21	10	47
Logan																						1					1	1
Lorain						4										1	36	33				1			1	36	38	75
Mahoning						2																					2	2
Medina				6									1			1	6	6							7	7	6	20
Meigs		1	6	60	13	16	4	1			1														60	18	24	102
Mercer																			3	1					3	1		4
Monroe	29	18	21	7	32	12		2										1							36	50	36	122
Morgan	2	2	6		3											6	10	12				1			8	15	19	42
Muskingum			1			1				1						60	41	60				1			60	42	63	165
Noble	4	1	7		11	10												1							4	12	18	34
Ottawa																				2						2		2
Perry				5	7	4		1								44	50	36							49	57	41	147
Portage																1		1							1		1	2
Putnam																					1						1	1
Richland																		1									1	1
Sandusky																					3						3	3
Stark						1					1					1	185	24							1	185	26	212
Summit													1				5	3								6	3	9
Trumbull											1																1	1
Tuscarawas					8	7											6	4								14	11	25
Vinton																		1									1	1
Warren																				1						1		1
Washington	17	11	20		1	11																			17	12	31	60
Wayne													5			1	3	13							1	8	13	22
Wood																			1	1	2				1	1	2	4
Total Exploratory	65	43	74	114	103	121	23	8		7	8		10	2		130	384	258	8	12	8	5			317	582	484	1,383
DRILLED FOR GAS STORAGE																												
Columbiana					3																					3		3
Hocking																	19	1								19	1	20
Knox																	2									2		2
Richland																	5	1								5	1	6
Summit																	15									15		15
Wayne																	13									13		13
Total Gas Storage					3												54	2								57	2	59
Grand Total	65	43	74	114	106	121	23	8		7	8		10	2		130	438	260	8	12	8	5			317	639	486	1,442

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DEVELOPMENTS IN WEST VIRGINIA IN 1947[1]

R. C. TUCKER[2]
Morgantown, West Virginia

ABSTRACT

In all, 942 wells were drilled in West Virginia during 1947, or 127 more than in 1946. There were 976 permits to drill or deepen, 178 more than in 1946. There were 547 wells abandoned under permit, and 275 wells abandoned under original drilling permit numbers, or a total of 822. The total abandonments were 627 in 1946. Wells completed were: gas, 644; oil, 93; oil and gas, 25; storage *et cetera*, 9; dry, 171. The 1946 totals were: gas, 555; oil, 73; oil and gas, 36; storage *et cetera*, 3; dry, 148. Wells ranged in depth from 385 to 8,120 feet, compared with 300 to 8,410 feet in 1946. Total footage drilled (excluding original depths of wells deepened) was 2,570,198, compared with 2,317,101½ feet in 1946. The average depth of wells (including original depths of deepened wells) was 2,819 feet, compared with 2,843 feet in 1946. The total initial gas produced was 506,672 MCF., compared with 670,621 MCF. in 1946. Range in size of wells, 10 to 18,151 MCF., compared with 10 to 19,673 MCF. in 1946. Total initial daily oil, 1,567 barrels, compared with 1,206 barrels in 1946. Range in size of oil wells, ¼ barrel to 380 barrels, compared with 1/20 barrel to 400 barrels in 1946. Number of wells drilling or completions unreported at end of year, 310, compared with 304 at end of 1946. Preliminary estimates of production for 1947: gas, 222,100,000 MCF.; oil, 2,599,000 barrels. Estimated number of producing wells at end of 1947: gas, 14,000; oil, 17,000. Table gives statistics by counties.

The table of oil and gas operations in West Virginia by counties in 1947 gives the salient facts regarding drilling results. Comparisons with 1946 figures are also shown in the bottom line of the table. More completions during 1947 for gas, oil, storage wells, and dry holes will be noted, the combination oil and gas wells being slightly less than 1946 figures. Permits to drill or deepen issued by the State Department of Mines totaled 976, or 178 more than were issued in 1946. Total completions were 942 as against 815 in 1946. Eight counties accounted for approximately half (465) the wells drilled, Lincoln (93), Kanawha (84), Wyoming (69), Ritchie (67), Calhoun (55), Boone (40), and Jackson (35).

Drilling depths ranged from 385 to 8,120 feet as against a range of 300 to 8,410 feet in 1946.

The total footage drilled increased more than 230,000 feet. In this total, only the additional depth drilled in the deepened wells is included in with the total depths of the new wells. However, in the next column giving average depth of wells, the total depths of all wells new and deepened are included. The average is 24 feet less than in 1946 because of the smaller number of Oriskany wells completed and a comparatively large number of wells drilled in shallow territory.

The total initial daily gas in 1947 was 506,672 MCF., or 163,949 MCF. less than in 1946. The average size of the gas wells was slightly less than 800 MCF. daily. The range in size was from 10 to 18,151 MCF. One well in 1946 had a larger initial size (19,673) MCF.

The daily initial oil was up 361 barrels daily more than the 1946 figures (1,206) with 1,567 barrels. The range in size of oil wells was from ¼ barrel to 380 barrels. One well in 1947 had a daily initial of 400 barrels.

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, March 13, 1948.

[2] Assistant State geologist.

TABLE I

Oil and Gas Operations in West Virginia by Counties, 1947

County	Permits		Completions						Range in Depth (Feet)	Total Footage Drilled (original depths of Wells deepened not included)	Average Depth of Wells (original depths of Wells deepened are included)	Total Initial Daily Gas MCF.	Range in Size of Gas Wells MCF.	Total Initial Daily Oil (Bbls.)	Range in Size of Oil Wells (Bbls.)	Number of Drilling Wells or Completions not Reported at End of Year
	To Drill or Deepen	To Abandon (Wells not drilled under permit)*	Gas Wells	Oil Wells	Oil and Gas Wells	Storage, etc. Wells	Dry Holes	Total								
Barbour	9	—	10	—	—	—	3	13	3,953–4,569	57,246	4,404	1,607	58– 492	—	—	4
Boone	40	4	31	2	—	1	6	40	1,238–4,860	105,154	2,958	10,434	60– 4,162	23	5– 18	14
Braxton	38	3	21	2	1	—	8	32	1,439–2,680	62,277	2,122	11,025	75– 3,250	62	1– 50	11
Booke	3	2	—	3	—	—	1	4	1,326–1,781	5,778	1,444	—	—	17½	0½– 12	1
Cabell	6	—	7	—	—	—	1	8	1,877–3,514	18,847	2,792	1,205	54– 625	—	—	—
Calhoun	51	6	31	14	2	—	8	55	854–2,643	98,545	1,993	9,042	46– 1,525	172	3– 75	8
Clay	12	4	8	—	—	—	5	13	947–2,455	22,410	1,856	3,555	22– 1,400	—	—	2
Doddridge	11	44	10	—	—	—	2	12	1,436–2,708	24,431	2,185	2,019	40– 601	—	—	2
Fayette	8	—	5	—	—	—	8	13	1,647–7,406	38,061	2,928	2,726	31– 900	—	—	2
Gilmer	31	15	26	—	—	2	4	32	1,231–2,700	57,475	1,942	5,416	25– 1,058	—	—	3
Greenbrier	—	—	—	—	—	—	1	1	8,120	8,120	8,120	—	—	—	—	—
Hancock	2	—	—	—	—	—	1	1	4,795	4,795	4,795	—	—	—	—	1
Harrison	5	90	5	—	—	2	1	8	1,708–4,244	11,214	2,575	425	30– 187	—	—	—
Jackson	37	7	17	2	1	—	15	35	1,543–5,332	152,615	4,360	35,444	65– 5,738	35	2– 25	12
Kanawha	71	38	51	14	2	1	16	84	1,338–5,694	314,574	3,745	115,033	10–18,151	399	2–106	28
Lewis	16	30	9	3	—	1	4	17	1,490–4,755	42,994	2,936	2,467	31– 989	31	1– 20	3
Lincoln	88	12	85	2	1	—	5	93	729–4,242	306,367	3,436	30,109	36– 2,400	5	1½– 2	28
Logan	24	1	13	3	1	—	4	21	1,784–3,568	54,175	2,653	15,416	24– 9,205	520	20–380	9
McDowell	6	—	1	—	—	—	—	1	4,161	4,161	4,161	211	211	—	—	6
Marion	27	36	17	—	—	1	9	27	784–3,542	47,969	1,859	2,277	45– 300	—	—	6
Marshall	5	14	5	—	—	—	1	6	1,578–3,040	11,911	1,985	660	40– 408	—	—	—
Mason	5	1	—	—	—	—	—	—	—	—	—	—	—	—	—	5
Mingo	32	2	28	1	1	—	—	30	818–3,827	85,052	2,926	34,652	33–15,349	16	7– 9	9
Monongalia	—	10	—	—	—	—	2	2	2,930–3,746	6,676	3,338	—	—	—	—	—
Monroe	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
Nicholas	12	—	12	—	—	—	4	16	1,625–8,052	35,173	2,347	14,860	80– 4,787	—	—	5
Ohio	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Pleasants	19	12	9	3	3	—	3	18	680–2,147	29,235	1,624	3,461	20– 1,000	37	1– 15	5
Preston	2	—	1	—	—	—	—	1	5,420	5,420	5,420	3,005	3,005	—	—	1
Putnam	47	2	21	—	—	—	5	26	1,824–5,201	89,974	3,461	23,022	60– 7,154	—	—	5
Raleigh	31	—	24	—	—	—	7	31	1,579–6,504	91,356	2,947	19,517	30– 3,546	—	—	12
Ritchie	66	34	27	20	4	—	16	67	615–3,343	129,728	1,990	5,446	30– 600	93½	0½– 10	16
Roane	21	16	8	1	5	—	3	17	1,023–2,168	26,818	1,699	2,824	21– 800	20	2– 7	6
Summers	—	—	—	—	—	—	1	1	6,972	6,972	6,972	—	—	—	—	—
Taylor	4	4	1	—	—	1	—	2	1,636–1,955	3,591	1,795	9,544	9,544	—	—	2
Tyler	1	64	—	1	—	—	—	1	850	850	850	—	—	3	3	1
Upshur	25	—	23	—	—	—	2	25	1,110–4,833	95,178	3,917	6,097	29– 1,754	—	—	7
Wayne	94	—	61	7	—	—	1	69	908–3,615	180,893	2,680	26,382	21– 2,768	49	2½– 15	41
Wetzel	4	75	2	—	—	—	—	2	2,809–2,854	3,751	2,831	233	23– 200	—	—	3
Wirt	22	1	11	3	2	—	6	22	1,023–2,851	49,698	2,259	17,101	21– 5,000	13½	1– 5	6
Wood	23	18	—	12	2	—	10	24	385–2,366	39,995	1,666	346	146– 200	71	0½– 20	3
Wyoming	73	—	64	—	—	—	8	72	1,625–6,809	240,713	3,343	91,051	49– 9,010	—	—	38
Totals, 1947	976	547*	644	93	25	9	171	942	385–8,120	2,570,198	2,819	506,672	10–18,151	1,567	0½–380	310
Totals, 1946	798	494*	555	73	36	3	148	815	300–8,410	2,317,101½	2,843	670,621	10–19,673	1,206	01/20–400	304

* 275 wells were abandoned in 1947 under original drilling permit No. (Wells drilled since May, 1929). Not included in above total, 135 such wells were abandoned in 1946.

At the end of the year, 310 wells were drilling or unreported if completed. The writer wrote all the operators whose wells had not been reported asking the status of each well as of December 31, 1947. All but a few operators supplied the information. At the end of 1946 there were 304 wells in this category.

During the year, 547 old wells (drilled before May, 1929) were abandoned and in addition 275 more wells drilled under permit were abandoned under the original drilling permit number. It was impossible to allocate these 275 wells by counties as the report of the State Department of Mines for the year 1947 is still in the hands of the printer.

Oil was discovered in the Berea sand (depth, 2,131 feet) near Silverton, Jackson County, and several wells are now drilling there. Several Big lime (Greenbrier) oil wells were drilled in Kanawha and Logan counties.

The deep well (8,120) feet drilled by rotary in Greenbrier County went to the Clinton sand and showed some gas in Big Six (or Keefer) sand and possibly some in the Clinton. The record is not yet available.

Some additional gas in the Corniferous limestone and Oriskany sand was obtained in Preston County, with one test uncompleted but showing gas. The test in Garrett County, Maryland, near the Preston County, West Virginia, line was dry in the Oriskany sand although high on structure.

One test to the Trenton limestone is drilling in Wayne County and was below 5,600 feet at the end of the year, with some gas showing in Big Six sand.

Preliminary estimates of production for 1947 are: oil 2,599,000 barrels; gas, 222,100,000 MCF.

It is estimated that at the end of the year there were 14,000 gas wells and 17,000 oil wells producing in the state.

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DEVELOPMENTS IN VIRGINIA IN 1947[1]

PHILIP JENKINS[2]
Prestonburg, Kentucky

ABSTRACT

VIRGINIA. The area in which oil or gas might be found in Virginia is very limited because of faulted structural conditions. Gas was first developed in commercial quantities from the Early Grove field near Bristol in 1938. The first oil in commercial quantities was discovered in the fenster area near Rose Hill in Lee County, Virginia, in 1944. This oil is produced from the Trenton limestone of Middle Ordovician age. Since the discovery, 30 wells have been drilled, of which 15 were producing approximately 400 barrels daily by the end of 1946. During 1947 with no important new discoveries, and because of physical and mechanical difficulties encountered in producing the Rose Hill oil, the daily production is greatly decreased.

The most important development in Virginia during 1947, was started by major gas-producing companies in Buchanan County. By the end of 1947, three wells were being drilled by the United Producing Company, Inc. At this writing one of the wells on the W. M. Ritter Lumber Company's land came in at a depth of 2301 feet, producing 17,000 MCF from the Maxon sand. More than 200,000 acres have been leased and other leases are being made to major and independent operators.

It is the forecast of the writer that this area of Virginia will have more extensive exploration during 1948 than it has in the past.

Twenty-four wells have been drilled in the Rose Hill area of Lee County, Virginia, in 1947. Of the 24 wells drilled, 9 were producers and 15 dry holes. All of the producing wells were confined to the Martin Creek and Possum Hollow fensters in the Cumberland overthrust block. All wells were completed in the Trenton with depths ranging from 1200 to 1800 feet. Five strings of cable tools have been operating most of the year with a peak production in April of 210 barrels per day. Since then production from new wells has not been sufficient to offset depletion, as the field is now producing only 82 barrels per day.

One gas well has been completed by the United Carbon Company in Buchanan County at a depth of 2300 feet in the Maxton (Maxon) sand of Upper Mississippian age with an open flow of 17,196,000 cubic feet. At the present, two wells are being drilled, one of which is reported to have saturation at a depth of 6100 feet. Four additional rigs are moving onto locations.

In Wise County a well is being drilled by Thomas and James about 3 miles northeast of Big Stone Gap. At present they are drilling at 2450 feet, probably in the Stones River. This well is expected to be completed 500 feet in the Knox dolomite if production is not found at less depth.

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, March 11, 1948.

[2] Assistant geologist, Kentucky West Virginia Gas Company.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 913-917, 1 FIG., 3 TABLES

DEVELOPMENTS IN KENTUCKY IN 1947[1]

E. BOYNE WOOD[2]
Lexington, Kentucky

ABSTRACT

The continuation in the search for oil and gas in the Middle and Lower Ordovician was of particular interest in 1947.

Most of the new oil and gas discoveries were located in western Kentucky in producing zones ranging in age from Pennsylvanian to Devonian.

Eastern Kentucky development has taken place in formations from Pennsylvanian to Lower Ordovician and there were several interesting discoveries. These include successful wells in the St. Peter sandstone and the Knox dolomite.

The development of the Seventy-Six pool in the Ordovician of Clinton County has accounted for most of the activity in the south-central part of the state.

Estimated oil production in 1947 was in excess of 9,500,000 barrels.

INTRODUCTION

The development of Kentucky's oil and gas resources in 1947 followed the same general outline as during the previous year. The deeper drilling program met with some success in eastern Kentucky. Most of the successful pool discoveries were made in western Kentucky, one of which was particularly important. Eastern Kentucky provided a few new discoveries, but most of the activity was in the development of the Devonian Shale gas field. Development of the Seventy-Six pool in Clinton County accounted for most of the drilling activity in the south-central part of the state.

In all, 1,244 wells were known to have been drilled, 801 of which were successful. This was an increase of 292 wells over the total in 1946. In spite of this increase in number of wells drilled, production was actually less. A little more than 9,500,000 barrels of oil were produced in 1947, as compared with 10,924,283 barrels in 1946.

DEEP DRILLING

One of the most interesting 1947 developments in the search for oil and gas in Kentucky was the successful completion of five Lower Ordovician wells in eastern Kentucky. Two of these were drilled in Estill County by the South Central Petroleum Company and produced gas from the St. Peter sandstone. Two other deep wells, drilled by the Pure Oil Company, produced oil from the Knox dolomite. The second well is now reported to be producing about 10 barrels per day.

There were at least twelve Knox wells drilled in 1947. Continuation of the deeper-drilling program is assured for 1948, due to the following successes.

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, March 19, 1948.

[2] Geological Division, Kentucky Department of Mines and Minerals. Contributing authors: Stanley G. Elder and Coleman D. Hunter.

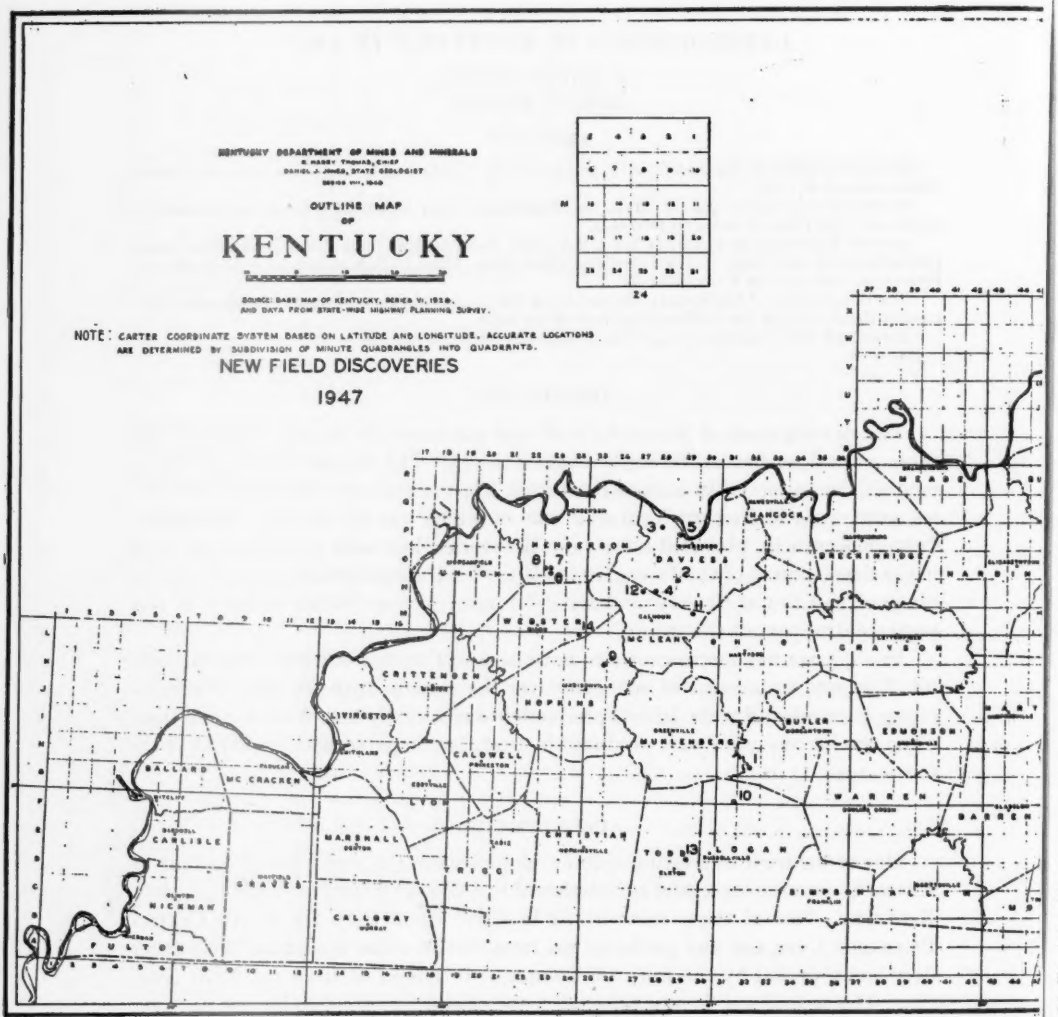
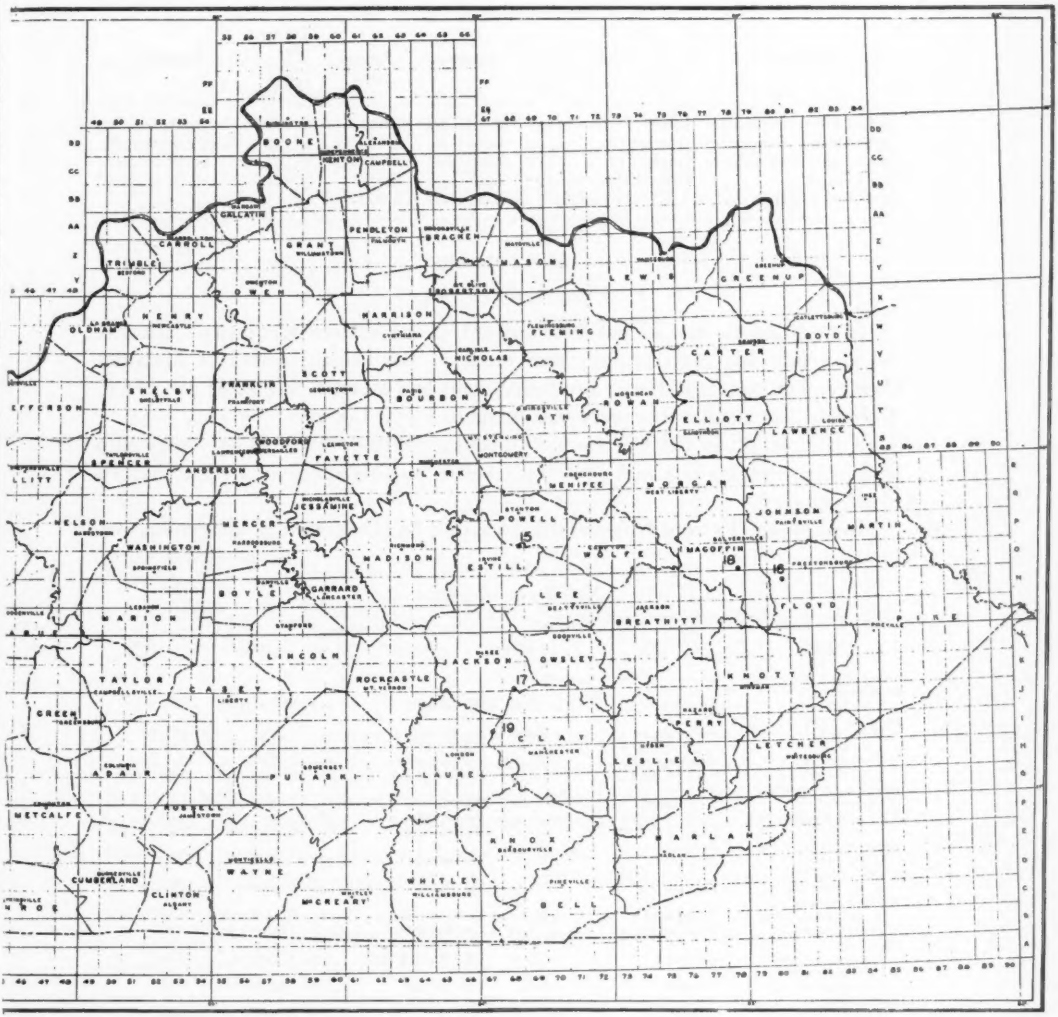


FIG. 1.—New-field dis

1. McPearsons
2. Pettit
3. Stanley N
4. Guffie E
5. Owensboro N
6. Tunnel Hill N
7. Cairo
8. Cairo New
9. Anton
10. Lewisburg



coveries in Kentucky in 1947.

11. Buck Creek
12. Johnson Island
13. Unnamed
14. Slaughters
15. Furnace
16. Middlecreek
17. Maulden
18. Royalton
19. Unnamed

Operator	Fee	Location	Formation	Producing Depth (Feet)	Remarks
South Central Petroleum	Pruitt, Miller & Goff	Estill Co.	Knox	3,688	570.000 cu. ft.
South Central Petroleum	Garrett 1A	Estill Co.	St. Peter	2,538	8,420,000 cu. ft.
South Central Petroleum	Garrett 2A	Estill Co.	St. Peter	2,594	11,710,000 cu. ft.
Pure Oil Co.	Gilbert Hammons 1	Clay Co.	Knox	3,514	
Pure Oil Co.	J. C. McKnight 1	Laurel Co.	Knox	3,455	

DEVELOPMENT

EASTERN KENTUCKY

In addition to the normal development of the eastern Kentucky shale gas fields, a new Big Six discovery was made in the Royalton area of Magoffin County. The largest of the 37 producing wells had an open flow of 23,750 MCF. A similar, but smaller discovery was made in Floyd County.

A completion in the Corniferous in southeastern Jackson County may also lead to the opening of a new pool. This well is making approximately 12 barrels of oil per day.

In all, 355 wells were drilled in this area, only 80 of which were non-productive.

TABLE I

NEW-FIELD DISCOVERIES

Operator	Fee	Location	Formation	Total Depth (Feet)	Field	Gas Oil
BUTLER COUNTY						
Ivan Greene	Arnold 1	18-H-32	Hardinsburg	445	McPearsons	Oil
DAVIESS COUNTY						
D. G. & S.	Fulkerson 1	5-N-29	Tar Springs	1,235	Pettit	Oil
J. C. Ellis	A. Pendleton 1	7-P-28	Palestine	1,036	Stanley N	Oil
R. Compton	Worthington 1	15-N-28	Ste. Genevieve	1,989	Guffie E	Oil
Sohio Petroleum	S. B. Smith 1	14-P-29	Waltersburg	1,071	Owensboro N	Oil
HENDERSON COUNTY						
Carter Oil Co.	Westerman 1	24-O-23	Waltersburg	1,774	Tunnel Hill N	Oil
Pioneer Drilling Co.	A. Cottingham 1	17-O-23	Waltersburg	1,789	Cairo	Oil
C. E. O'Neal	Fellows 1	16-O-23	Waltersburg	1,755	Cairo New	Oil
HOPKINS COUNTY						
O. O. Borden	Johnson 1	1-K-25	Tar Springs	2,369	Anton	Gas
LOGAN COUNTY						
S. W. Mitchell	Logsdon 1	21-G-31	Ste. Genevieve	594	Lewisburg	Oil
MCLEAN COUNTY						
R. Holtzclaw, et al.	Underwood 1	9-M-29	Penn. sandstone	1,161	Buck Creek	Oil
Miller-Shiarella	Leachman 6	13-N-27	Cypress-Bethel	2,055	Johnson Is.	Oil
TODD COUNTY						
Cuistion & Cable	Hadden 1	22-E-29	Chattanooga shale	1,693	Unnamed	Gas
WEBSTER COUNTY						
Geo. Engle, et al.	Dixon 1	2-L-24	Tar Springs	2,580	Slaughters	Oil
ESTILL COUNTY						
South Central Pet. Co.	Garrett 1A	22-P-68	St. Peter	2,586	Furnace	Gas (8,420 MCF)
FLOYD COUNTY						
Hall & Spradlin		8-N-80	Big Six	2,650	Middlecreek	Gas (200 MCF)
JACKSON COUNTY						
Hossier Drilling Co.	McWharter	23-K-68	Corniferous	1,182	Maulden	Oil (12 Bbls./D)
MAGOFFIN COUNTY						
W. E. Kouns		22-O-78	Big Six	2,245	Royalton	Gas (4,500 MCF)
CLAY COUNTY						
Pure Oil Compny	Gilbert Hammons 1	2-H-67	Knox dolomite	4,002	Unnamed	Oil

TABLE II

FIELD EXTENSIONS

Operator	*Fee*	*Location*	*Formation*	*Total Depth (Feet)*	*Field*	*Gas Oil*
DAVIESS COUNTY						
J. C. Ellis	J. E. Sauer 1	8-P-28	Tar Springs	1,274	Griffith	Gas
HENDERSON COUNTY						
W. F. Lacy	W. W. Brackett 1	4-N-23	Waltersburg	1,800	Tunnel Hill	Oil
Q. B. Mitchell	Thornsberry 1	7-N-23	Cypress	2,267	Tunnel Hill	Oil
Mitchell-Thorne	Kellin 1	17-P-21	McClosky	2,670	Hitesville Cons.	Oil
UNION COUNTY						
Ashland-Sun	Hite 1	15-P-20	Waltersburg	1,758	Uniontown	Oil
Carter	Moore 1	21-P-20	McClosky	2,695	Hitesville	Oil
WEBSTER COUNTY						
George Engle	Sizemore 1	3-L-24	Tar Springs	2,560	Slaughters	Oil

TABLE III

NEW POOLS

Operator	*Fee*	*Location*	*Formation*	*Total Depth (Feet)*	*Field*	*Gas Oil*
DAVIESS COUNTY						
Ashland Oil Co.	Jacobs 1	7-P-28	Tar Springs	1,195	Stanley N.	Oil
HENDERSON COUNTY						
Carter Oil Co.	Johnston 1	5-O-23	McClosky	2,731	Tunnel Hill	Oil
Sun Oil Co.	Williams 1	24-R-20	Waltersburg	1,863	Grassy Pond	Oil
Sun Oil Co.	F. Pritchett 13	21-O-22	Tar Springs	1,902	Dixie	Oil
Carter Oil Co.	Melton 1	4-N-23	Waltersburg	1,783	Tunnel Hill	Oil
Carter Oil Co.	W. Adams 2	4-N-23	McClosky	2,252	Tunnel Hill	Oil

WESTERN KENTUCKY

Probably more concentrated drilling and development has taken place in this section than in any other part of the state with an increase in activity over the previous year. In all, 667 wells have been drilled, 361 of which were successful. Included in these successful wells were discoveries of new fields, extensions of old pools, and new pools. There were 14 new fields, 7 extensions, and 6 new pools. Perhaps the most important discovery was the Slaughters field in Webster County.

Production figures show a total of 7,513,412 barrels of oil in 1947, which is a decrease of 1,399,668 barrels over 1946.

SOUTH-CENTRAL KENTUCKY

Development of the Seventy-Six pool has accounted for most of the activity in Clinton County. This pool produces in the Stones River series. Additional drilling has also taken place in developing the shallow Granville pools in that County. This area reported 222 wells drilled, and of these, probably 165 were successful. Production totaled 486,590 barrels in 1947, as compared with 546,884 barrels in 1946.

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DEVELOPMENTS IN TENNESSEE IN 1947[1]

H. B. BURWELL[2]
Nashville, Tennessee

During the year, 25 tests were drilled in Tennessee. Two new-field wildcats were successful, oil being found in Mississippian sandstone in one and Knox dolomite in the other. The drilling of 25 tests in 1947 represents a sharp increase over the 1946 completions.

DEEP DRILLING

By all odds the most important exploratory test in Tennessee during 1947 was the California Company's E. W. Beeler No. 1, Coordinate NE. NE., Sec. 4, T. 15 S., R. 29 E., Giles County. Formational tops and generalized lithologic character of the test as released by the California Company are as follows.

Depth (Feet)	*Thickness (Feet)*	
0– 660	660	Black River-Stones River limestone, shaly and silty limestone in part cherty
660– 729	69	Wells Creek dolomitic limestone
–3,770	3,041	Lower Ordovician and Upper Cambrian dolomite. Possible Knox dolomite equivalent
–4,390	620	Dolomite, fine medium to coarsely crystalline, slightly cherty
–4,800	410	Dolomite, sugary to finely crystalline in part slightly cherty and in part shaly
–5,230	430	Dolomite with small amounts of green shale
–5,310	80	Dolomite with small percentages of poorly sorted sand
–5,410	100	Dolomite, some gray shale
–5,580	170	Dolomite, somewhat sandy
–5,620	40	Sand or sub-quartzite
–5,705	85	Quartzite with granite fragments, probably metamorphosed granite wash
–5,750	45	Granite

Several showings of oil were encountered which were subsequently tested with negative results.

During 1947 the Magnolia Petroleum Company started a test on the Cumberland Plateau near Gruetli, Grundy County, Coordinate NE. SW., Sec. 15, T. 14 S., R. 48 E. It is reported that this test will be drilled to the basement complex.

NEW DISCOVERY

Considerable interest is being shown over the discovery of a commercial oil well in the upper part of the Knox dolomite in Pickett County, Tennessee. This test resulted from a continued search for oil in the Knox which has been carried on for several years. The search was stimulated by showings in the Knox in tests in this area.

[1] Read by title before the Association at Denver, April 26–29, 1948. Manuscript received, April 12, 1948.

[2] State geologist.

Also significant is the discovery of a commercial well in rocks of Chester age on the Cumberland Plateau in Morgan County, Tennessee.

Operator	*County*	*Location*	*Deepest Formation Tested (Feet)*	*Total Depth (Feet)*	*Oil and Gas*
		IMPORTANT WILDCATS			
Carroll, Roberts, & Murphy	Fentress	18-A-54E	Knox dolomite	2,053	Dry
Ray Steckoll	Fentress	7-A-54E	Knox dolomite	2,106	Dry
Carroll, Roberts, & Murphy	Fentress	13-A-54E	Knox dolomite	1,895	Dry
The California Company	Giles	4-15S-29E	Basement complex	5,750	Dry
Sam Jarvis	Pickett	25-B-53E	Knox dolomite	2,050	Dry
E. R. Hoy	Pickett	14-A-54F	Knox dolomite	1,728	Dry
E. P. Jarvis	Scott	10-3S-60E	Stones River	3,004	Dry
		NEW-FIELD DISCOVERIES			
W. G. Burrage	Morgan	4-5S-58E	Chester	1,234	25 bbls.
Alvin C. York	Pickett	14-A-54E	Knox dolomite	1,702	20 bbls.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 920-930, 1 FIG., 9 TABLES

DEVELOPMENTS IN ILLINOIS AND INDIANA IN 1947[1]

ALFRED H. BELL[2] AND RALPH E. ESAREY[3]
Urbana, Illinois, and Bloomington, Indiana

ABSTRACT

In all, 2,727 wells were drilled for oil and gas in Illinois and Indiana in 1947 as compared with 2,870 in 1946, a decrease of 5 per cent. Total oil production decreased 11 per cent from 82,128,000 barrels in 1946 to 72,900,000 barrels in 1947. Wildcat drilling increased from 760 completions in 1946 to 792 completions in 1947. Forty-four new pools and approximately 76 extensions were discovered in the two states in 1947 as a result of wildcat drilling.

The new production found in 1947 was almost entirely from Mississippian strata. Little deep drilling was done, and no major amounts of oil were produced from strata below the Mississippian. A "Trenton" pool, Woburn South, was discovered in Bond County, Illinois, which had six producing wells at the end of the year. Drilling is expected to continue in 1948 at nearly the same rate as in 1947.

INTRODUCTION

The area discussed in this paper includes Illinois and Indiana. Most of the oil and gas drilling was done in the southern part of Illinois and the southwestern part of Indiana. Oil and gas drilling in the two states decreased 5 per cent, from 2,870 completions in 1946 to 2,727 completions in 1947. Oil production decreased 11 per cent, from 82,128,000 barrels in 1946 to 72,900,000 barrels in 1947. Wildcat drilling increased from 760 completions in 1946 to 792 completions in 1947. Forty-four new pools and approximately 75 extensions to old pools were discovered in the two states in 1947 as a result of wildcat drilling.

The new production discovered in 1947 was largely from Mississippian strata. Of the 44 new pools discovered, three were in Pennsylvanian sandstones, one was in the "Trenton" (Ordovician) limestone, and the remaining 40 were in Mississippian sandstones and limestones; of these, 18 were in Chester sandstones and 22 were in Lower Mississippian limestone or sandstones.

Little deep drilling was done and no major amounts of oil were produced from strata below the Mississippian. The one new pre-Mississippian pool, Woburn South in Bond County, Illinois, had six producing wells in the "Trenton" at the end of the year.

Drilling is expected to continue during 1948 at nearly the same rate as in 1947.

The details of development are discussed separately for each state.

ILLINOIS

By Alfred H. Bell

In Illinois, 2,046 wells were completed for oil and gas in 1947, a decrease of 13 per cent from 1946. Drilling resulted in 1,071 oil wells, 9 gas wells, and 966 dry

[1] Read by title before the Association at Denver, April 26–29, 1948. Manuscript received, March 22, 1948.

[2] Geologist and head, Oil and Gas Division, Illinois State Geological Survey, Urbana, Illinois.

[3] Professor of geology, Indiana University, Bloomington, Indiana.

TABLE I

DISCOVERY WELLS OF NEW POOLS IN ILLINOIS IN 1947

Pool	*County*	*Company and Farm*	*Location*	*Total Depth (Feet)*	*Producing Formation*	*Depth to Top (Feet)*	*Initial Production (Barrels)*[a]
1. Ab Lake	Gallatin	Sohio, J. Lynch 1	32-8S-10E	2,790	Renault	2,655	149
2. Beman East	Lawrence	S. Zanetis, H. W. Mahrenholz 1	19-3N-10W	1,904	McClosky	1,882	190; 175
3. Berryville	Wabash	British American, A. Higgins 1	36-2N-14W	2,903	McClosky	2,901	223
4. Bible Grove North	Effingham	Gilliam & Aspin, E. Adams 1	10-6N-7E	2,878	McClosky	2,868	102; 30
5. Bone Gap South	Edwards	Inland Producers, G. Harms 1	19-1S-14W	3,126	Cypress	2,712	498; 80
6. Burnt Prairie South	White	British American, Duckworth 1	7-4S-9E	3,552	Lower Ohara	3,417	72
7. Centerville North	White	F. Heldt, C. & M. Endicott 1	28-3S-10E	3,233	Bethel	2,991	38; 50
8. Concord Central	White	W. O. Allen, Ackerman 1	4-7S-10E	2,913	Aux Vases	2,900	135
9. Cottonwood	Gallatin	Nat'l. Assoc. Pet., J. C. Moye 1-A	33-7S-9E	2,328	Tar Springs	2,314	6
10. Divide East	Jefferson	Nat'l. Assoc. Pet., D. McElravy 1	17-1S-4E	2,647	Aux Vases	2,637	109; 17
11. Eberle	Effingham	Nat'l. Assoc. Pet., A. Jacobs 1	24-6N-6E	2,866	McClosky	2,823	118; 200
12. Elliottstown	Effingham	Gulf (Schock), J. M. Schultz 1	32-7N-7E	2,884	Rosiclare	2,730	62; 20
13. Fairfield East	Wayne	Tuley & Carter, A. Martin 1	4-2S-8E	3,200	Aux Vases	3,178	16
14. Half Moon	Wayne	Collins Bros., M. Flowers 1	27-1S-9E	3,403	McClosky	3,353	60; 40
15. Helena	Lawrence	Fox & Fox, E. Bass 1	11-2N-13W	1,803	Waltersburg	1,776	12; 100
16. Herald East	White	J. Reznik, H. Grant 1	13-7S-9E	2,300	Waltersburg	2,291	196
17. Hunt City South	Jasper	Robinson & Puckett, G. Dillman 1	18-7N-11E	2,460	McClosky	2,436	10; 6
18. Iowa South	Clay	Robinson & Puckett, B. Colclasure 1	11-4N-5E	2,703	McClosky	2,581	80; 40
19. Iuka	Marion	J. M. Gilliam, H. Ebe 1	14-2N-4E	2,886	Ste. Genevieve	2,702	232; 100
20. Kenner North	Clay	Nat'l. Assoc. Pet., N. O. Golden 1	17-3N-6E	2,772	Bethel	2,758	87
21. Kenner West	Clay	Phillips Pet., E. Spiker 1	23-3N-5E	3,038	Cypress	2,585	95; 70
22. Lexington	Wabash	F. J. Fleming et al., W. Berberich 1	26-1S-14W	3,016	McClosky	2,966	250
23. Massilon South	Edwards	Magnolia, L. W. Wilson 1	18-1S-10E	3,391	Lower Ohara	3,313	4; 1
24. Miletus	Marion	Nat'l. Assoc. Pet., G. Boye et al. 1	21-4N-4E	2,212	Aux Vases	2,199	38; 32
25. Newton West	Jasper	McCullough Drlg., Winterrowd 1	10-6N-9E	3,016	McClosky	2,991	8; 18
26. Stanford West	Clay	Nat'l. Assoc. Pet., O. Hickle 1	33-3N-7E	3,047	McClosky	3,031	305
27. Westfield East	Clark	Van Tarble, Tarble Bros. 3	2-11N-14W	428	Pennsylvanian	418	50
28. Woburn South	Bond	L. Horton, W. Kokorudz 1	21-6N-2W	3,167	"Trenton"	3,151	70

[a] Oil and water.

TABLE II

DISCOVERY WELLS OF EXTENSIONS TO POOLS IN ILLINOIS IN 1947

Pool	County	Company	Farm	Location	Total Depth	Producing Formation	Top of Pay	Initial Production Bbls.[a]
1. Albion Consol.	Edwards	N. Redwine	McKinley-Walker Comm. 1	31-1S-14W	3,198	McClosky	3,150	25; 1
2. Albion East	Edwards	Wm. Bell	F. Fieber 1	31-2S-14W	3,231	Rosiclare McClosky	3,126 3,168	42; 30
3. Beaver Creek South	Clinton	A. M. Fowley & A. Jackson	Burkett 1	5-3N-2W	1,150	Bethel	1,147	5; 5
4. Beman East	Lawrence	S. Zanetis	Lindsay 1	20-3N-10W	1,907	Aux Vases Rosiclare McClosky	1,809 1,860 1,881	2; 20
5. Bible Grove East	Clay	Calvert & Willis	L. Shields 1	23-5N-7E	2,953	McClosky	2,878	10; 20
6. Bible Grove East	Clay	N. V. Duncan	A. A. Harmon Heirs 1	27-5N-7E	2,978	Aux Vases	2,783	115; 50
7. Bone Cap South	Edwards	E. Witt (D. Miller)	F. S. Racster 1	18-1S-14W	3,191	McClosky	3,058	70; 15
8. Bonpas	Richland	Gilliam et al.	J. Provines 1	34-3N-14W	3,136	McClosky	3,128	30; 180
9. Boyleston Consol.	Wayne	B. J. Taylor et al.	A. R. Burkett 1	18-1S-7E	3,345	Aux Vases Rosiclare	3,155 3,259	40; 150
10. Boyleston Consol.	Wayne	Robinson & Puckett	Henson Cons. 1	30-1S-8E	3,453	McClosky	3,320	30; 60
11. Browns	Wabash	Cherry & Kidd	Gray-Tanquary 1	27-1S-14W	2,903	McClosky	2,958	41; 15
12. Browns South	Edwards	Lynn, Calvert & Willis	A. J. Messman 1	9-2S-14W	3,075	Bethel Aux Vases	2,828 2,950	11
13. Calhoun	Richland	O. Weston	E. O. Kirk 1	29-3N-10E	3,168	McClosky	3,134	140
14. Calvin North	White	D. Miller Drlg.	Johnson 1	6-4S-11E	3,204	Lower Ohara	3,048	42; 40
15. Cisne	Wayne	N. Redwine	W. Lusk 1	3-1S-7E	3,310	Lower Ohara McClosky	3,151 3,200	17; 33
16. Clay City Consol.	Wayne	Robinson & Puckett	M. Shackleford 1	2-1N-8E	3,091	Rosiclare	3,072	200
17. Clay City Consol.	Wayne	D. Slape et al.	F. Pettijohn 1	27-2N-7E	2,986	Aux Vases	2,978	95
18. Clay City Consol.	Wayne	D. Slape	S. O. Hosselton 1	29-2N-8E	3,010	Rosiclare	3,003	65; trace
19. Clay City Consol.	Wayne	Tuley & Carter	J. O. Sandlin 1	35-2N-8E	3,087	McClosky	3,076	72
20. Clay City Consol.	Clay	W. Bell	C. T. Smith 1	35-3N-8E	3,074	Aux Vases	2,882	73
21. Clay City Consol.	Wayne	Robinson & Puckett	D. Perardi 1	7-1S-8E	3,135	Aux Vases	3,113	110
22. Cottonwood	Gallatin	Mealy & Wolfe	L. M. Mills 1	28-7S-9E	2,331	Tar Springs	2,289	10,500,000 cu. ft.
23. Cowling	Edwards	G. Wickham	Mason-Schroeder 1	22-2S-14W	3,009	Bethel	2,751	32
24. Dubois	Washington	W. O. Allen	J. L. Kasban 1	18-3S-1W	1,336	Cypress	1,185	5,200,000 cu. ft.
25. Ewing	Franklin	Sohio	Bosserman 1	5-5S-3E	2,841	Aux Vases	2,830	117
26. Geff	Wayne	Tuley & Carter	J. C. Stanley 1	18-1S-8E	3,107	Aux Vases	3,083	80
27. Geff West	Wayne	A. J. Slagter	J. T. Haynes 1	4-1S-7E	3,172	Aux Vases	3,105	42; 3
28. Geff West	Wayne	Nation Oil	W. G. Cisne 1	10-1S-7E	3,110	Aux Vases	3,098	35; 25
29. Grayville West	White	B. Lambert	Robinson Heirs 1	27-3S-10E	2,871	Cypress	2,831	63
30. Half Moon	Wayne	George & Wrather	W. C. Turner 1	23-1S-9E	3,375	Rosiclare	3,340	60; 40
31. Herald	White	Central Pipe Line	T. Poole 1	25-6S-9E	3,140	Lower Ohara	2,962	121; 40
32. Herald	White	B. M. Heath	M. E. Austin 1	32-6S-9E	2,506	Degonia	1,920	66; 20
33. Herald East	White	Oil Mgt.	Eubanks 1	18-7S-10E	2,930	Aux Vases	2,918	89
34. Hoosier North	Clay	Evans & Barrow	L. Stanley 1	35-5N-7E	2,960	McClosky	2,853	71; 15

TABLE II—(*continued*)

Pool	*County*	*Company*	*Farm*	*Location*	*Total Depth*	*Producing Formation*	*Top of Pay*	*Initial Production Bbls.*[a]
35. Johnsonville Consol.	Wayne	Nat'l. Assoc. Pet.	Z. H. Grinestaff 1	25-1N-6E	3,213	McClosky	3,208	134
36. Johnsonville West	Wayne	Puritan Drlg.	B. Spicer 1	24-1N-5E	2,973	Aux Vases	2,954	200; 65
37. Johnsonville West	Wayne	Taylor	B. Watkins 1	26-1N-5E	3,087	McClosky	3,064	120
38. Junction	Gallatin	C. E. Skiles	Stinson 1	9-9S-9E	2,012	Pennsylvanian	1,429	17
39. Junction North	Gallatin	Delta Drlg.	Ingleton 1	34-8S-9E	1,587	Pennsylvanian	1,564	40
40. Keensburg Consol.	Wabash	Ill.-Mid-Continent	Krutz 1	25-2S-14W	2,874	Tar Springs	2,096	15; 15
41. Kenner	Clay	A. J. Slagter	C. Tackitt 1	36-3N-5E	2,987	Rosiclare	2,875	65; 2
42. Kenner North	Clay	Nat'l. Assoc. Pet.	E. Spiker 1	12-3N-5E	2,803	Aux Vases	2,779	20; 20
43. Lancaster East	Wabash	Arvin Drlg.	E. Alka 1	35-2N-13W	2,750	Rosiclare	2,662	150
44. Leech Consol.	White	Nation Oil	C. E. Haefely 1	20-3N-9E	3,478	McClosky	3,377	43; 20
45. Lillyville	Effingham	Nat'l. Assoc. Pet.	J. J. Schneiderjan 1	6-8N-7E	2,416	McClosky	2,403	90
46. Maud North	Wabash	Calvert & Willis	A. Garwood 1	16-1S-13W	2,608	Bethel	2,586	34
47. Maud North	Wabash	Hayes & Wolfe	L. Peter A-1	20-1S-13W	2,939	Rosiclare	2,859	32; 1
48. Maunie North	White	J. H. Gilliam	W. Hines 1	36-5S-10E	3,167	Paint Creek	2,812	97
49. Mt. Erie South	Wayne	Nat'l. Assoc. Pet.	E. Tidball 1	23-1S-8E	2,188	Lower Ohara	3,097	113
50. New Harmony-Griffin Consol.	White	Magnolia	F. E. Henning 1	19-5S-14W	3,127	Rosiclare	3,014	15; 6
51. Noble	Richland	Calvert & Willis	Yunker et al. 1	14-3N-8E	3,090	Rosiclare	3,002	84; 14
52. Noble North	Richland	P. Fulk	T. Dresser 1	36-4N-9E	2,981	Cypress	2,554	18; 2
53. Olney East	Richland	George & Wrather	M. Leaf 1	13-4N-10E	3,082	McClosky	3,068	23; 50
54. Passport	Clay	T. B. Dirickson	Kuenstler 1	2-4N-8E	3,025	McClosky	3,019	720 (BOF)
55. Roland	Gallatin	C. E. Brehm	J. W. Oliver et al. 1	29-7S-8E	2,115	Waltersburg	2,084	30
56. Rural Hill	Hamilton	B. Taylor	Wilson 1	30-6S-6E	3,192	Aux Vases	3,180	52; 71
57. Sailor Springs Consol.	Clay	Nat'l. Assoc. Pet.	S. Lee 1	15-3N-7E	2,990	McClosky	2,949	84
58. Sailer Springs Consol.	Clay	E. A. Obering	Armstrong 1	20-3N-7E	2,992	McClosky	2,978	105; 11
59. Salem	Marion	Schlafly & Slivka	R. N. Davis 1	21-1N-2E	1,928	Bethel	1,918	5; 75
60. Salem	Marion	B. Taylor et al.	H. J. Sebastian 1	21-1N-2E	1,935	Bethel	1,920	11; 30
61. Shattuc	Clinton	F. E. Turner	F. Mann 1	28-2N-1W	1,295	Cypress	1,288	44
62. Shelbyville	Shelby	P. Doran	R. Manning 1	14-11N-4E	2,084	Aux Vases	1,866	69; 43
63. Storms	White	Ashland & Buchman	A. Orman 1	18-6S-10E	3,062	McClosky	3,027	50
64. Trumbull	White	Pure	M. E. Husk 1	20-5S-9E	3,352	Aux Vases Rosiclare	3,194 3,288	6; 31
65. Trumbull	White	W. E. Witt	J. W. Williams 1	6-5S-9E	3,382	McClosky	3,288	48; 18
66. Westfield East	Clark	F. Hessler	B. Buckler 1	36-12N-14W	460	Pennsylvanian	453	3
67. Willow Hill Consol.	Jasper	Robinson & Puckett	C. J. McCord 1	23-7N-10E	2,597	Rosiclare	2,549	87
68. Woburn South	Bond	L. Horton	L. F. Stoecklin 1	16-6N-2W	3,179	"Trenton"	3,158	45
69. Woodlawn	Jefferson	C. E. Townsend	O. Watkins et al. 1	25-2S-1E	2,036	Bethel	2,026	72

[a] Oil and water.

TABLE III. DISCOVERY WELLS OF ADDITIONAL PRODUCING ZONES IN POOLS IN ILLINOIS IN 1947

Pool	*County*	*Company and Farm*	*Location*	*Total Depth (Feet)*	*Producing Formation*	*Depth to Top (Feet)*	*Initial Production (Barrels)*[a]
1. Albion East	Edwards	W. Bell, F. Fieber 1	31-2S-14W	3,231	Rosiclare[b]	3,126	42; 30
2. Beman East	Lawrence	S. Zanetis, Lindsay 1	20-3N-10W	1,907	Aux Vases[c]; Rosiclare	1,809; 1,860	2; 20
3. Berryville	Wabash	Phillips Pet., Fite 1	35-2N-14W	3,013	Rosiclare[b]	2,911	150; 2
4. Bible Grove East	Clay	Calvert & Willis, L. Shields 1	23-5N-7E	2,953	McClosky	2,878	10; 20
5. Bible Grove East	Clay	N. V. Duncan, A. A. Harmon Heirs 1	27-5N-7E	2,978	Aux Vases	2,783	115; 50
6. Bible Grove North	Effingham	Superior, C. Kluthe 1	10-6N-7E	2,887	Cypress[b]	2,533	54; 14
7. Bible Grove North	Effingham	Texas, A. J. Bloemeker 1	10-6N-7E	2,944	Rosiclare	2,835	7; 23
8. Bible Grove South	Clay	W. Duncan, Harden-Webster Comm. 1	20-5N-7E	2,758	Cypress	2,500	26
9. Bone Gap	Edwards	Cities Services, L. Thread "A" —1	18-1S-11E	3,316	Rosiclare	3,198	99
10. Bone Gap South	Edwards	Calvert & Willis, Briggs 1	19-1S-14W	3,090	Aux Vases	3,015	125
11. Bone Gap South	Edwards	E. Witt (D. Miller), F. S. Racster 1	18-1S-14W	3,101	McClosky	3,058	76; 15
12. Browns	Wabash	Potter, Reeves, Lobell; Bedell 1	34-1S-14W	3,010	Rosiclare[b]	2,973	225; 10
13. Browns	Wabash	Cherry & Kidd, Gray-Newman, 5	4-2S-14W	3,031	Tar Springs[b]	2,364	90; 40
14. Browns South	Edwards	Lynn, Calvert & Willis; A. J. Messman 1	9-2S-14W	3,075	Aux Vases[b]	2,950	11
15. Calvin North	White	D. Miller Drlg., Johnson 1	6-4S-11E	3,204	Lower Ohara	3,048	42; 40
16. Concord Central	White	Great Lakes Carbon, Calvert 1	4-7S-10E	3,053	Cypress[c]; McClosky	2,607; 2,970	9; 9
17. Concord North	White	C. E. Brehm, A. William 1	10-6S-10E	3,071	Lower Ohara[b]	3,033	80
18. Cowling	Edwards	G. Wickham, G. Broster 1	34-2S-14W	2,016	Palestine	2,001	248
19. Dubois	Washington	W. O. Allen, J. L. Kasban 1	18-3S-1W	1,336	Cypress	1,185	5,200,000 cu. ft.
20. Eberle	Effingham	Nat'l. Assoc. Pet., A. Jacobs 2	24-6N-6E	2,483	Cypress	2,473	32; 10
21. Ellery South	Edwards	Henman & Gher, H. E. Perkins 1	33-2S-10E	3,346	Aux Vases	3,209	20; 5
22. Epworth East	White	W. O. Allen, Brimble-Combe 1	28-5S-10E	3,127	Tar Springs	2,350	500
23. Ewing	Franklin	Sohio, Bosserman 1	5-5S-3E	2,841	Aux Vases	2,830	117
24. Geff West	Wayne	A. J. Slagter, Jr., Barnard 1	4-1S-7E	3,214	McClosky[b]	3,199	77; 80
25. Geff West	Wayne	A. J. Slagter, Evans 1	4-1S-7E	3,205	Rosiclare	3,202	25; 30
26. Grayville	White	S. C. Yingling, Sanders 1	20-3S-14W	2,772	Waltersburg	2,302	153
27. Half Moon	Wayne	George & Wrather, W. C. Turner 1	23-1S-9E	3,375	Rosiclare	3,340	60; 40
28. Herald	White	B. M. Heath, M. E. Austin 1	32-6S-9E	2,506	Degonia	1,920	66; 20
29. Herald East	White	C. E. Skiles, Williams 1	13-7S-9E	2,414	Tar Springs	2,397	20; 20
30. Herald East	Gallatin	J. Reznik, C. Glover 1	24-7S-9E	3,093	Aux Vases	2,924	194
31. Hoosier North	Clay	J. W. Rudy, P. W. Bateman 1	26-5N-7E	2,565	Cypress	2,560	28
32. Hoosier North	Clay	Evans & Barrow, I. Brooks Comm. 1	35-5N-7E	2,905	Lower Ohara[b]	2,881	20
33. Hoosier North	Clay	Nat'l Assoc. Pet., C. Wattles 1	35-5N-7E	2,908	McClosky	2,891	24
34. Inman	Gallatin	C. C. Clark, Daily 2	11-8S-10E	932	Pennsylvanian	924	25
35. Inman North	Gallatin	Coy & Ashland, Foster 1	19-8S-9E	2,360	Hardinsburg	2,330	24; 2
36. Inman North	Gallatin	Coy & Ashland, Foster 2	11-8S-9E	2,524	Cypress	2,510	50
37. Inman North	Gallatin	Coy & Ashland, Foster 3	11-8S-9E	2,545	Tar Springs[b]	2,177	52; 35
38. Inman West	Gallatin	Kingwood, Schiff 1	21-8S-9E	2,957	Palestine[b]	1,915	32; 17
39. Junction	Gallatin	C. E. Skiles, Stinson 1	9-9S-9E	2,012	Pennsylvanian	1,429	17
40. Junction North	Gallatin	Delta Drlg., Ingleton 1	34-8S-9E	1,587	Pennsylvanian	1,564	40
41. Kenner	Clay	A. J. Slagter, C. Tackitt 1	36-3N-5E	2,987	Rosiclare	2,875	65; 2
42. Kenner North	Clay	Nat'l. Assoc. Pet., E. Spiker 1	12-3N-5E	2,803	Aux Vases	2,779	20; 20
43. Kenner North	Clay	Nat'l. Assoc. Pet., Theobald 4-A	17-3N-6E	3,041	McClosky	2,964	308
44. Kenner West	Clay	Phillips Pet., Colclasure 4	23-3N-5E	3,047	McClosky	2,869	38; 71
45. Kenner West	Clay	Phillips Pet., Randall 1	23-3N-5E	3,006	Bethel[b]	2,703	241; 50
46. Lancaster Central	Wabash	Nu-Enamel, A. H. Barmes 1	7-1N-13W	2,854	Lower Ohara	2,739	168
47. Lancaster Central	Wabash	Nu-Enamel, C. F. Higgins 1	7-1N-13W	2,815	McClosky[b]	2,808	56; 6
48. Lancaster East	Wabash	Arvin Drlg., E. Alka 1	35-2N-13W	2,750	Rosiclare	2,662	150
49. Main	Crawford	W. H. Wright, Walters 1	19-7N-12W	1,823	Salem	1,817	20; 2
50. Maud	Wabash	Ill.-Mid-Continent, T. Grundon 1	35-1S-13W	2,308	Cypress	2,287	200
51. Maud North	Wabash	Hayes & Wolfe, L. Peter "A" —1	20-1S-13W	2,939	Rosiclare	2,859	32; 1
52. Maunie North	White	J. H. Gilliam, Slemaker 1	36-5S-10E	3,125	Rosiclare	3,033	101; 10
53. Miletus	Marion	Sun, H. Kaiser 2	16-4N-4E	2,160	Bethel	2,152	16
54. Miletus	Marion	Nat'l. Assoc. Pet., W. Adams 1	21-4N-4E	2,418	McClosky[b]	2,347	42; 47
55. New Haven West	Gallatin	Sohio, J. W. Tedford 2	23-7S-10E	2,936	Lower Ohara	2,789	7
56. Roland	White	Synclair Wyoming, C. D. Reddy 2	2-7S-8E	2,947	Clore[c]	1,994	26; 2
57. Russellville (gas)	Lawrence	H. A. Sprowls, W. H. Benson 2	18-4N-10W	1,570	McClosky	1,551	25; 100
58. Sailor Springs Consol.	Clay	P. Fulk, Stanford 2	9-3N-7E	2,989	Lower Ohara	2,943	200
59. Shattuc	Clinton	T. M. Conrey, E. Keister 2	27-2N-1W	1,438	Paint Creek	1,406	44
60. Stanford West	Clay	Nat'l. Assoc. Pet., J. N. Klein 2	33-3N-7E	3,083	Rosiclare[b]	2,978	40; 12
61. Trumbull	White	E. Witt, J. W. Williams 1	6-5S-9E	3,382	McClosky	3,288	48; 18
62. West Frankfort South	Franklin	H. Ames et al., Thompson 1-A	30-7S-3E	2,731	Aux Vases	2,703	15
63. West Frankfort South	Franklin	R. Bartmes et al., West Frankfort Packing Co. 1-A	30-7S-3E	2,912	McClosky	2,827	248+trace
64. Whittington West	Franklin	M. H. Richardson, Franklin Co. Coal 1	14-5S-2E	2,786	Rosiclare	2,779	11; 1
65. Woodlawn	Jefferson	N. Redwine, Laney et al. 1	24-2S-1E	2,217	Rosiclare	2,195	7+trace

[a] Oil and water. [b] Dual completion. [c] Triple completion.

holes. Of the 536[4] wildcat wells drilled, 28 discovered pools and 69 discovered extensions to pools (Tables I and II). In addition, 65 wells, most of which can not be designated properly as exploratory wells, discovered additional producing zones in known producing areas (Table III).

The geographic pattern of drilling followed that prevalent in recent years, the greatest number of completions by counties being in Wabash (301) followed by Wayne (253), White (223), and Clay (196) counties. Wells in Clay County averaged 160 barrels initial production compared with a state average of 100 barrels.

The pools with the greatest numbers of well completions in 1947 were as follows: Clay City Consolidated, 120 completions; New Harmony Consolidated, 63 completions; Willow Hill Consolidated, 63 completions; Allendale, 61 completions; and Sailor Springs Consolidated, 52 completions.

Total oil production in Illinois in 1947 was 66,459,000 barrels as compared with 75,297,000 barrels in 1946, a decrease of 13 per cent. Average daily production in 1947 was 182,000 barrels. Average daily production, by months during the year varied from 193,000 barrels in January to 175,000 barrels in August and November.

EXPLORATORY DRILLING

As may be noted on the map (Fig. 1) the new pools discovered were all within short distances of previous production so that no new regions were opened for exploration and development during the year. One of the new pools, Kenner West in Clay County, Illinois (No. 21, Fig. 1) is located on a structure which was mapped on outcropping Pennsylvanian strata and recommended for testing by the Illinois Geological Survey in *Report of Investigations 40*, published in 1936. At the end of the year, this pool had 21 wells producing from the Cypress and Bethel sandstones at approximate average depths of 2,570 feet and 2,705 feet, respectively. The pool had an approximate total production at the end of the year of 225,000 barrels. This was the most oil produced by any one of the 1947 discoveries. Kenner North, with 22 wells and a total production to the end of the year of 222,000 barrels, was a close second.

A list of some of the most noteworthy dry holes completed in 1947 is given in Table IV. Little deep testing was done. A well in Jersey County (Table IV, No. 15) located on the Lincoln fold which is adjacent to the Cap au Grés fault was drilled into the Lamotte sandstone (basal Cambrian). A well in Pike County,[5] not listed in Table IV because it was not reported complete at the end of 1947, was drilled to the pre-Cambrian granite on top of the Pittsfield-Hadley anticline. Depth to granite in this well was 2,221 feet, or an elevation of 1,401 feet below sea-level. The elevation of the top of the pre-Cambrian granite in a well 9 miles north-

[4] This figure does not include wells which tested additional producing zones in producing areas classified by Lahee as deeper-pool tests and shallower-pool tests.

[5] Panhandle Eastern Pipe Line Company's Mumford No. 1, NE. ¼, NE. ¼, NW. ¼, Sec. 21, T. 5 S., R. 4 W., Pike County.

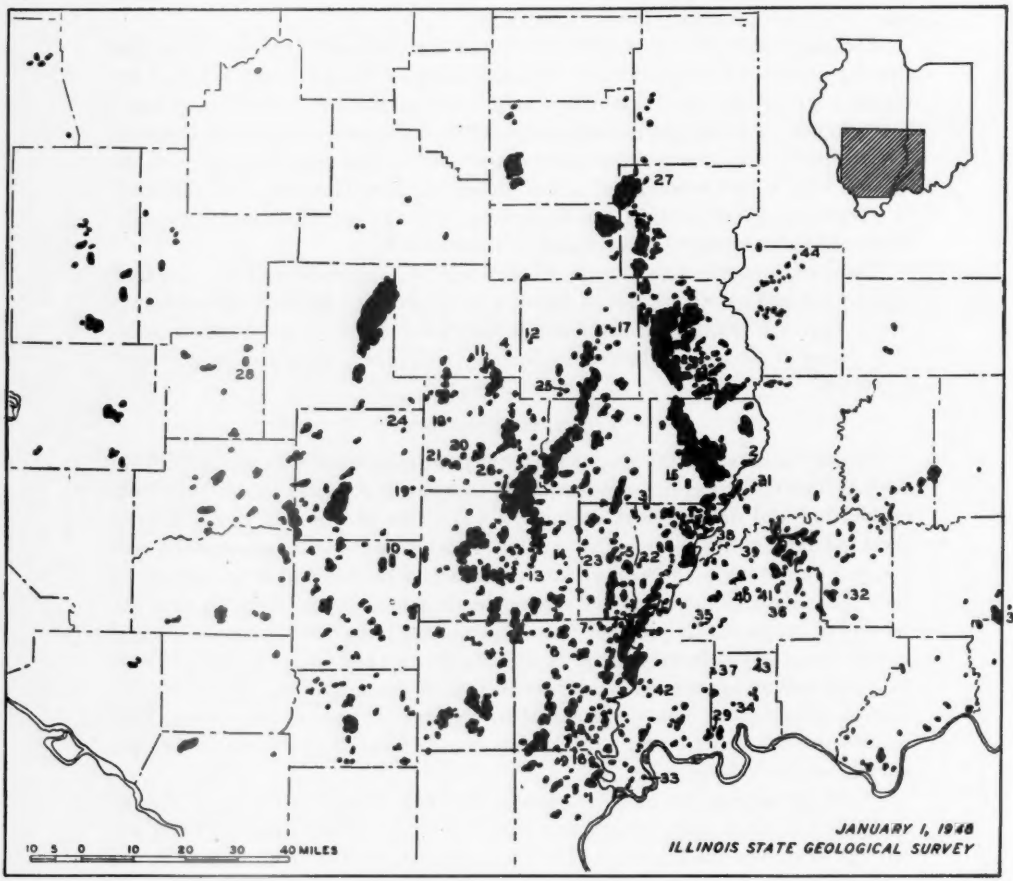

FIG. 1.—New pools discovered in 1947. All present and former oil- and gas-producing areas are shown in black. (See Tables I and VII for pool number identification.)

west, low on the north flank of the anticline, was 2,484 feet below sea-level, a difference of 1083 feet. Thus there appears to be a granite hill underlying the Pittsfield-Hadley anticline of considerably greater relief than that of the overlying sedimentary strata. This suggests that there may be granite hills under other major anticlinal structures of the Illinois area.

Some of the wells located in western Illinois (Table IV) were drilled in explora-

TABLE IV

SELECTED LIST OF DRY TESTS IN ILLINOIS IN 1947

Pool	*County*	*Company and Farm*	*Location*	*Total Depth (Feet)*	*Deepest Formation*	*Depth to Top (Feet)*
1.	Bond	H. Hoffma, G. Wilson "A" 3	24-4N-3W	2,460	Devonian	2,445
2.	Christian	Sun Oil, A. Ettinger 1	8-13N-1W	2,910	"Trenton"	2,788
3.	Clark	J. W. Menhall, Bubeck 2	11-9N-11W	2,580	Devonian	2,402
4.	Clark	J. W. Menhall, E. P. Daly 1	27-9N-11W	2,659	Devonian	2,478
5. Bartelso West	Clinton	P. Mosebach et al, C. Meyer 2	18-1N-3W	2,520	Devonian	2,446
6. Boulder	Clinton	Texas, Defend-Gray Comm. 1	35-3N-2W	3,813	"Trenton"	3,711
7. Carlyle	Clinton	Murphy Oil, Hempen 1	10-2N-3W	2,614	Devonian	2,518
8. Mattoon	Coles	Blalock & Walters, Coles County Locker Co. 1	11-12N-7E	3,211	Devonian	3,172
9. Mattoon	Coles	B. A. Baker, H. Hagen 1	1-12N-7E	3,181	Devonian	3,139
10.	Coles	H. Sanders et al, R. M. Childress 1-B	30-13N-11E	2,325	"Trenton"	2,134
11.	Coles	E. Zink, Bales 1	3-12N-9E	2,185	Devonian	2,114
12.	Douglas	Burkett & Farnham, A. Brock 1	7-15N-14W	859	Devonian	799
13.	Fayette	Nat'l. Assoc. Pet.-Ashland, J. M. Dugan 1	23-6N-1W	3,900	"Trenton"	3,737
14.	Hancock	D. E. Lambert, W. Griffith 1	26-7N-8W	1,102	St. Peter	977
15.	Jersey	T. R. Kerwin et al, Legate 1	2-6N-13W	2,680	Lamotte	2,670
16.	Macoupin	Sun Oil, C. C. Alford	3-9N-6W	2,552	Glenwood	2,536
17.	Madison	Texas, Hosto 1	18-5N-5W	2,755	Plattin	2,744
18. Miletus	Marion	Nat'l. Assoc. Pet., Lacy 5	21-4N-4E	3,950	Clear Creek	3,787
19.	Montgomery	J. Reznik, Monke 1	4-7N-5W	2,600	"Trenton"	2,490
20	Washington	L. V. Horton, B. Huck 1	16-1S-2W	2,965	Devonian	2,876

TABLE V

WILDCAT WELLS DRILLED IN ILLINOIS IN 1947, CLASSIFIED BY METHOD OF LOCATION

Method of Location	*Wildcat Near*[a]		*Wildcat Far*[b]		*Total Wildcats*	*Total Producers*	*Percentage Successful*
	Total	*Producers*	*Total*	*Producers*			
Geology	296	69	169	22	465	91	19.5
Geophysics	1	0	2	0	3	0	0.0
Geology and Geophysics	12	0	26	6	38	6	15.8
	309	69	197	28	506	97	19.2
Nonscientific	3	0	23	0	26	0	0
Unknown	2	0	2	0	4	0	0
Total	314	69	222	28	536	97	18.1

[a] One half to 2 miles from production.
[b] More than 2 miles from production.

tion for additional Silurian coral reefs, like the one that is productive of oil in the Marine pool, Madison County. Although as yet no additional oil-bearing reefs have been located, there is still a large unexplored territory.[6]

[6] Heinz A. Lowenstam, "Marine Pool, Madison County, Illinois, Silurian Reef Producer," *Struc. Typ. Amer. Oil Fields*, Vol. III, Amer. Assoc. Petrol. Geol. (1948), pp. 153–88.

METHODS OF EXPLORATION

The principal methods used in locating exploratory wells continued to be subsurface geology and the reflection seismograph (see Table V). The amount of seismograph work in Illinois increased 25 per cent from 284 crew-weeks in 1946 to 354 crew-weeks in 1947.

TABLE VI

GEOPHYSICAL EXPLORATION BY MONTHS IN ILLINOIS IN 1947

Period (*1947*)	*Seismograph* (a) (b)	*Gravity*	*Resistivity*
Jan.	8—32	1–4	1–4
Feb.	8—32	1–4	1–4
Mar.	8—32	1–4	1–4
Apr.	7—28	2–6	1–4
May	8—32	2–8	1–4
June	8—30	2–8	1–4
July	7—28	2–8	1–4
Aug.	7—28	2–8	1–4
Sept.	7—28	2–8	1–4
Oct.	6—26	1–6	1–4
Nov.	6—24	1–4	1–4
Dec.	6—24	1–4	1–4

[a] First figure indicates number of crews working.
[b] Second figure indicates number of working weeks completed.

INDIANA

BY RALPH E. ESAREY

Drilling activity in Indiana was the greatest since the opening of the Eastern Interior basin. In all, 666 wells were drilled, of which 340 were producing field wells, and 24 were successful wildcats. In addition, 6 wells opened extensions to oil fields, and 8 wells discovered oil in deeper or shallower sands in present pro-

TABLE VII

DISCOVERY WELLS OF NEW POOLS IN INDIANA IN 1947

Pool	*County*	*Company and Farm*	*Location*	*Total Depth (Feet)*	*Producing Formation*
29. Belknap	Vanderburgh	G. Engle, Helfrich 1	18-6S-11W	1,872	Waltersburg
30. Birdseye East	Crawford	H. A. Kays, St. Clair 1	31-2S-2W	995	Salem
31. Cathlinett	Knox	Zink et al., Halter 1	8-2N-10W	1,885	Rosiclare
32. Coe	Pike	R. Halbert, Ayrshire Coll. 1	30-2S-7W	1,423	Ste. Genevieve
33. College North	Posey	Calvert & Willis, Hastings 1	10-8S-14W	2,337	Ste. Genevieve
34. Evansville	Vanderburgh	Calvert & Willis, Engli 1	2-6S-11W	895	Pennsylvanian ss
35. Fleener	Gibson	C. A. Lynch, Fleener 1	22-3S-12W	1,880	Waltersburg
36. Francisco South	Gibson	J. Reznik, Weber 1	30-2S-9W	1,942	Ste. Genevieve
37. Martin	Vanderburgh	O'Neal et al., Wassmer 1	6-5S-11W	2,296	Cypress
38. Orrville	Knox	H. E. Ledbetter et al., Elkins 1	12-1S-12W	2,167	Bethel
39. Patoka East	Gibson	J. Savage, Hall 1	19-1S-10W	1,921	Cypress
40. Princeton New	Gibson	Princeton Mining, McCarty 1	13-2S-11W	2,184	Ste. Genevieve
41. Princeton South	Gibson	Kingwood Oil, Steiner 1	16-2S-10W	2,155	Ste. Genevieve
42. Solitude	Posey	Indiana Farm Bur., Highman Est. 1	31-5S-13W	3,039	Palestine
43. Stacer	Vanderburgh	J. Reznik, Feil 1	28-4S-10W	2,214	Ste. Genevieve
44. Standard	Sullivan	A. S. Reid, Jewell 1	22-9N-9W	643	Pennsylvanian

ducing areas. A total of 16 new fields was discovered: 5 in Gibson County, 4 in Vanderburgh, 2 in Posey, 2 in Knox, 1 in Pike, 1 in Crawford, and 1 in Sullivan County. The opening of the Evansville field created some excitement when substantial amounts of oil were produced from the Pennsylvanian sands at 900 feet. In this field, 17 wells were completed by the end of the year.

A great many wildcats were drilled around the edge of the basin where Chester sands vary from 500 to 1500 feet in depth. Several of the productive spots were

TABLE VIII

DISCOVERY WELLS OF EXTENSIONS TO POOLS IN INDIANA IN 1947

Pool	*County*	*Company and Farm*	*Location*	*Total Depth (Feet)*	*Producing Formation*
Decker	Knox	K. D. Holland, Ruppel 1	1-1N-11W	1,883	McClosky
Mt. Carmel	Gibson	I. Van Tuyl, Putnam 1	26-1S-12W	2,111	Bethel
New Boston	Perry	C. A. Busick, Gayer 1	5-6S-3W	516	Jackson
Owensville North	Gibson	Deep Vein Coal, Davis 2	6-2S-11W	2,326	McClosky
Owensville North	Gibson	Superior, Hardiman 2	18-2S-11W	2,371	McClosky
Princeton North	Gibson	George & Wrather, Beloat 1	8-2S-10W	1,841	Cypress
Peru	Miami	J. Minneci, Butt 1	24-27N-4E	876	Trenton

TABLE IX

DISCOVERY WELLS OF ADDITIONAL PRODUCING ZONES IN POOLS IN INDIANA IN 1947

Pool	*County*	*Company and Farm*	*Location*	*Total Depth (Feet)*	*Producing Formation*
Dodds Bridge	Sullivan	M. Myers, Bradgon Heirs 1	5-8N-10W	590	Pennsylvanian
Hovey West	Posey	B. M. Heath, A. Gray Est. 1	36-7S-15W	2,167	Waltersburg
Mt. Carmel	Knox	H. E. Ledbetter, Steckler 7	22-1S-12W	2,095	Lower Ohara
Owensville	Gibson	Ashland-O'Neal, Bender 1	36-3S-12W	2,551	Bethel
Princeton North	Gibson	Princeton Mining, Hunt 1	8-2S-10W	1,944	Bethel
Rockport	Spencer	Port Rock Oil Co., Hayden 3-A	30-7S-6W	1,099	Cypress
Rockport	Spencer	D. Stinson, Axton 1	30-7S-6W	913	Tar Springs
Solitude	Posey	Indiana Farm Bur., M. Perry 2	31-5S-13W	3,016	McClosky
Springfield	Posey	Texas, Golden 1	19-15S-13W	2,126	Waltersburg
St. Thomas	Knox	E. Zink, Indiana Def.	19-2N-10W	1,662	Cypress

found in and around the old fields. The counties of Pike, Daviess, Sullivan, Spencer, Martin, Greene, and Warrick received more attention than in previous years. In seven of the new fields, oil was found in the Ste. Genevieve limestone, emphasizing the importance of that formation as a reservoir rock .

The number of gas wells reported during the year was 41, and all were producers. More than 4 million cubic feet of daily open flow was added to the gas production of the state by the opening of the four new fields. The Sun Oil Company opened a potential gas field in the Devonian limestone at 1,900 feet in Greene County, but the well was abandoned, eventually. The reported open flow was 2 million cubic feet per day. Another test may be drilled in the near future.

The "pocket" area (Posey, Vanderburgh, and Gibson counties) continued to be the most active from the standpoint of wells drilled and total number of completions. The Griffin field remained the largest producer, where 458 wells averaged 3,925 barrels per day throughout the year. The deepest tests made in the basin

were the Thomas No. 1 in Sullivan County which tested the St. Peter at depth of 4,328 feet, and the Bodine, No. 1, the deepest well stratigraphically, which was abandoned in the Shakopee dolomite at 2,417 feet in Fountain County. The pipeline runs for the year indicate that Indiana produced about 6,441,500 barrels of crude oil.

Outside the basin, a new strike in the old Trenton field near Peru, Miami County, caused a small flurry of activity. The field is an extension of an old productive area opened 50 years ago. Oil is produced from the Trenton limestone at 850 feet. The best well had an initial production of more than 100 barrels per day.

An additional pool producing from the Salem limestone was opened near Birdseye in Crawford County. It is an extension of the old Birdseye field abandoned many years ago. The top of the saturated zone is about 1,000 feet in depth. An interesting wildcat was drilled to the basement rock in Allen County, near Fort Wayne; the pre-Cambrian was reached at about 3,500 feet, without finding saturation in the overlying formations.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 931-939, 1 FIG., 6 TABLES

DEVELOPMENTS IN MICHIGAN IN 1947[1]

LYLE W. PRICE[2]
Lansing, Michigan

ABSTRACT

Results of exploratory drilling in Michigan during 1947 were considerably more favorable than during 1946. Of the 263 wildcats drilled, 20 were completed as producing wells, resulting in the discovery of 10 oil fields and 4 gas fields and in the extension of 5 oil fields and 1 gas field. The Kimball Lake field, Newaygo County, Mount Forest field, Bay County, and Stony Lake field, Oceana County, developed new oil reserves. The new gas fields were not of significant size.

Permits to drill 886 wells were issued during 1947, an increase of 164 over 1946. In all, 896 wells were completed compared with 823 completed in 1946. Of these completions, 36 per cent (318) were oil wells, 21 per cent (191) were gas wells, and 43 per cent (387) were dry holes. The average initial potential of the oil wells was 406 barrels per well. The average initial potential of the gas wells was 6,368,586 cubic feet per well. The total footage drilled during the year was 1,990,880 feet, approximately 5 per cent more than in 1946. Wildcat footage was 623,499 feet, an increase of approximately 2½ per cent.

Oil production during 1947 declined to a 5-year low of 16,215,613 barrels. Gas production increased to a new high of 23,954,925,000 cubic feet.

Core drilling continued to be the most satisfactory method of exploration. Permits were issued for 289 geological tests, an increase of 103 over 1946. Two hundred thirty-eight of these were issued for the West Michigan district, the most active in Michigan during 1947. The most significant oil discovery during 1947, the Kimball Lake field, Newaygo County, was the result of core-drill exploration. Little or no seismograph work was done.

The outstanding deep test of the year was the Ohio Oil Company and Pure Oil Company's Reinhardt well No. 1 in the West Branch field, Ogemaw County. It was commenced in February and at the end of 1947 was drilling at approximately 10,600 feet with no substantial showings of oil or gas.

INTRODUCTION

Oil and gas operations in 1947 were considerably more active than during 1946. Drilling permits were issued for 886 wells compared with 823 for 1946. Well completions totaled 896, an increase of 63 over 1946. Of these completions, 36 per cent (318) produced oil, 21 per cent (191) produced gas, and 43 per cent (387) were dry holes. Wildcat drilling established a success ratio of 1:13 as 20 of the 263 wildcat wells were productive. The total footage drilled was 1,990,880 feet, an increase of five per cent over 1946. Wildcat footage increased 2½ per cent to 623,499 feet, an average of 2,370 feet per well. The wildcat drilling resulted in the discovery of 10 oil fields and 4 gas fields and the extension of 5 oil fields and 1 gas field.

OIL

Oil production during 1947 continued a 5-year decline to a low of 16,215,613 barrels, a decrease of 858,905 barrels from the 1946 total. Table I shows a comparative distribution of wells in the districts of the state. The discovery of new fields and the development of older fields added important new oil reserves during

[1] Read by title before the Association at Denver, April 26–29, 1948. Manuscript received, April 1, 1948.

[2] Petroleum engineer, Geological Survey Division, Michigan Department of Conservation.

TABLE I

MICHIGAN OPERATIONS BY DISTRICTS IN 1947

Districts	Permits Issued	Wells Completed	Oil Wells	Initial Potential (Barrels)	Gas Wells	Initial Potential (1,000 Cu. Ft.)	Dry Holes	Production		Geological Test Permits
								Oil (Barrels)	Gas (1,000 Cu. Ft.)	
Basin	432	448	119	7,290	157[1]	981,657	161	13,670,331	21,084,795	31
Eastern and Southeastern	25	17			9	28,443	8	25,642	305,724	17
Northern	11	9	6	564			15	75,936	30,321	2
Southwestern	208	223	68	7,123	4	2,215	148	1,110,209	30,721	1
Western	210	199	125	114,601	21[2]	204,085	55	1,384,495	2,404,364	238
Totals	886	896	318	129,578	191	1,216,400	387	16,215,613	23,954,925	289

[1] 108 of these wells were drilled in old fields or in storage fields for in-put or withdrawal purposes.
[2] 19 of these wells were facility wells drilled in Goodwell field for withdrawal or in-put purposes.

TABLE II

1947 DISCOVERIES

County	Field	Section Township Range	Well	Permit Number	Date 1947	Depth of Pay (Feet)	Initial Production	Producing Formation	Method of Location	No. of Prod. Wells Jan. 1, 1948
			NEW FIELDS							
Allegan	Cheshire	27-1N-14W	F. Henry—Wilkinsen 1	12,910	3-10	1,289	35 oil, 20 water	Traverse	Subsurf.	2
Allegan	South Salem	34-4N-13W	Ford Oil—Bloom 1	13,438	8-27	1,679	65 oil, 15 water	Traverse	Subsurf.	2
Arenac	Sterling	18-19N-4E	D. Rayburn—Goodroe 1	13,665	11-24	2,872	120 acid	Dundee	Subsurf.	2
Bay	Mt. Forest	13-17N-4E	Reese & McClanahan Oil—Mercer & Knoodle 1	12,963	5-2	3,025	40 acid	Dundee	Subsurf.	15
Crawford	Beaver Creek	17-25N-4W	Pure—State Beaver Creek A-1	12,988	7-21	4,160	120 acid	Det. River	Core drill	3
Ionia	Unnamed	4-8N-5W	Caldwell—McKenna 1	13,200	9-8	3,028	33 acid	Dundee	Subsurf.	1
Mecosta	Wheatland	9-14N-7W	Carter—Smith Pet. Co. 1	12,883	3-30	1,401	400 M gas	Mich. Stray	Subsurf.	1
Midland	Jerome	7-15N-1W	Collins & Whitney—O'Dell 1	12,781	4-9	3,743	25 acid	Dundee	Subsurf.	1
Montcalm	Turk Lake	9-10N-8W	Ashby Oil & Gas—Wilson 1	13,212	6-20	1,082	2,740 M gas	Mich. Stray	Subsurf.	4
Newaygo	Barton	16-16N-11W	Mich. Dev. Pet. Co.—Corey 1	12,660	3-27	3,097	40 oil, 18 water	Traverse	Both	0[1]
Newaygo	Unnamed	33-13N-11W	Sun Oil—Wescott 1	13,146	11-17	2,883	1,250 M gas A.I.P.	Dundee	Core drill ?	1
Newaygo	Kimball Lake	11-12N-13W	Sun Oil—Linderer 1	12,892	2-23	2,332	500 est.	Traverse	Core drill	95
Osceola	Unnamed	26-18N-10W	Jetter & DeKrafft—Kearne 1	12,587	12-8	3,106	40 oil, 250 water	Traverse	Subsurf.	1
St. Clair	Algonac	29-3N-16E	Matlock—Folkert & Kane 1	13,585	10-15	158	54 M gas	Antrim	Subsurf.	2
			FIELD EXTENSIONS							
Allegan	Overisel	10-3N-14W	Wyse—Kline 1	12,784	1-14	1,521	25 acid	Traverse	Subsurf.	
Allegan	South Salem	34-4N-13W	Sleep—Utton 1	13,593	11-1	1,691	15 oil, 5 water	Traverse	Subsurf.	
Crawford	Beaver Creek	21-25N-4W	Pure—State Beaver Creek B-1	13,487	12-8	4,281	93 acid	Det. River	Core drill	
Montcalm	Cato	9-12N-8W	Ohio—Moyses-Keeney 1	12,748	2-3	3,531	140 acid	Det. River	Subsurf.	
Newaygo	Kimball Lake	24-12N-13W	Scott Drlg.—Mitchell 1	13,188	6-13	2,435	100 bbls./hr.	Traverse	Subsurf.	
Roscommon	Richfield	24-12N-1W	Sun—State Richfield D-1	12,928	5-1	4,290	930 M gas	Det. River	Both	

[1] Discovery well pumped until September then deepened to Dundee and abandoned.

1947. By the end of the year, 122 wells had been drilled in the new fields and the older fields had added 196 wells to bring the total of producible wells to 3,532.

The Western district of Michigan was the most active during 1947. The two most recent oil fields of significant size, Kimball Lake field, Newaygo County, and Stony Lake field, Oceana County (late 1946 discovery), are in this district. In the Kimball Lake field 95 wells were drilled during the year and 28 wells were drilled in the Stony Lake field.

DISCOVERIES

Two of the 10 oil-field discoveries (Table II) were developed to appreciable size by the end of the year. In the Kimball Lake field, Newaygo County, 95 wells, and in the Mount Forest field, Bay County, 15 wells, were completed. Only 12 wells were completed in the other 8 new oil fields.

The Kimball Lake field, the most extensively developed new field, was discovered by the Sun Oil Company with its Linderer No. 1 in Sec. 11, T. 12 N., R. 13 W., Newaygo County. This well, completed in February, 1947, at the total depth of 2,336 feet, 50 feet below the top of the Traverse formation, had a natural initial potential of 500 barrels per day. By the end of the year, 95 wells, drilled on a 20-acre diagonal pattern, had been completed in the field and 1,900 acres proved. The field produced 868,501 barrels of oil during the year even though it was placed under voluntary and State proration immediately after discovery. Allowables ranged from 100 barrels per day when first prorated to 50 barrels per day at the close of the year.

The Mount Forest field, Bay County, was discovered in May, 1947, by L. R. Reese and the McClanahan Oil Company. The extent of the field had not been defined by the end of the year although 15 wells had been completed. Production is from the Dundee limestone at a depth of 3,025 feet. The pattern of the field is one well to each 40 acres. Total production at the end of the year was 51,804 barrels from 560 proved acres.

FIELD DEVELOPMENT

The most active among the older fields during 1947 was the Stony Lake field, Oceana County, which was discovered late in 1946. At the end of the year, 29 wells had been drilled and proved an area of 1,160 acres. The field, which is owned entirely by the Carter Oil Company, produces from the Traverse limestone at a depth of about 1,630 feet. A production rate of 100 barrels per day per well has been established voluntarily by the company. The Kawkawlin field, Bay County, discovered in 1938, was expanded by 33 wells during the year raising its producing area to 1,900 acres. The Monterey field, Allegan County, also a 1938 discovery, added 20 wells making a total of 480 proved acres. The Arbela field, Tuscola County, a 1946 discovery, continued to expand as 17 new wells were completed during the year. The Pinconning field, Bay County, was of interest because of the

TABLE III
MICHIGAN OIL FIELDS
(January 1, 1948)

Field	County	Year of Discovery	Producing Formation	Depth to Pay (Feet)	API Gravity of Oil	Drilled Acreage	Recovery per Drilled Acre (Barrels)	Production in 1947 (Barrels)	Accumulative Production (Barrels)	No. of Prod. Wells Jan. 1 1948
Adams	Arenac	1937	Dundee	2,025	34.7	850	9,693	988,021	8,239,637	67
Akron	Tuscola	1936	Dundee	2,678	41.9	110		22,252	251,278	8
Allegan	Allegan	1937	Traverse	1,563				160	1,671	0
Arbela	Tuscola	1946	Dundee	2,757		230	238	48,005	54,849	23
Ashton	Osceola	1945	Traverse	2,950	42.0	160	692	46,830	110,731	4
			Dundee	3,645	40.0					
Atlanta	Montmorency	1945	Detroit River	2,185				1,192	1,192	3
Bangor	Van Buren	1939	Traverse	1,000	29.5	270	2,130	11,593	575,183	11
Barton	Newaygo	1947	Traverse	3,097	30.0			1,195	1,195	0
Beaverton	Gladwin	1934	Dundee	3,880	41.3	240	3,100	16,782	744,089	14
Beaver Creek	Crawford	1947	Detroit River	4,160				14,744	14,744	3
Belley Atchers	Montcalm	1944	Dundee	3,470	48.2	240	771	20,417	185,129	4
Bentley	Gladwin	1937	Dundee	3,510	42.1	770	1,473	65,652	1,134,235	37
Birch Run	Saginaw	1934	Berea	1,530	43.3			292	215,325	1
Bloomer	Montcalm and Ionia	1944	Traverse	2,640	42.3	480	1,247	170,352	598,356	14
Bloomingdale	Van Buren	1938	Traverse	1,220	42.0	3,460	2,656	95,470	9,190,451	96
Breedsville	Van Buren	1943	Traverse	1,080	33.9	230	1,086	9,509	249,844	4
Brenner	Allegan	1946	Traverse	1,690		200	700	33,086	140,038	16
Casco	Allegan and Van Buren	1940	Traverse	1,100	38.6	80	183	1,062	11,003	5
Cato	Montcalm	1944	Dundee	3,065		560	217	100,721	121,465	14
Cedar	Osceola	1943	Traverse	3,325		360	1,462	52,489	526,495	10
			Dundee	3,810	48.1					
			Detroit River	5,060	46.0					
Chase	Lake	1942	Berea of SW Michigan	2,466				360	2,597	1
Cheshire	Allegan	1947	Traverse	1,289				2,579	2,579	2
Clare City	Clare	1938	Mich. Stray	1,320	30.2	50	815	3,263	40,765	5
Clayton	Arenac	1936	Dundee	2,550	34.2	750	5,969	171,058	4,476,836	55
Coffee Lake	Van Buren	1946	Traverse	1,125		50	487	10,216	24,337	4
Coldwater	Isabella	1944	Dundee	3,730	46.0	3,120	1,400	1,745,816	4,369,994	77
Crystal	Montcalm	1935	Dundee	3,190	43.5	1,820	4,062	24,886	7,393,643	15
Currie	Isabella	1936	Dundee	3,920	45.9	20	8,508	2,416	170,151	2
Dallas	Clinton	1942	Traverse	2,482				268	3,085	2
Dalton	Muskegon	1940	Traverse	1,845		160	3,440	9,994	55,036	12
Day	Montcalm	1946	Dundee	3,337	43.0			4,092	6,570	2
Deep River	Arenac	1944	Dundee	2,795		1,010	7,403	2,872,033	7,476,604	100
Deerfield	Monroe	1920	Trenton	2,115	42.7	155	2,993	22,476	463,870	17
Diamond Springs	Allegan	1938	Traverse	1,465	41.0	430	2,056	14,715	863,337	19
Dorr	Allegan	1938	Traverse	1,600	41.0	310	1,115	13,953	345,625	8
Douglas	Montcalm	1945	Dundee	3,400	47.1	120	1,244	44,830	149,279	6
Dumont Lake	Allegan	1945	Traverse	1,477				49	368	0
Dwight	Huron	1945	Detroit River	2,862	36.2			2,775	7,429	1
East Norwich	Missaukee and Roscommon	1942	Traverse	2,410		2,000	719	358,398	1,437,968	50
			Dundee	3,080	44.2					
			Detroit River	4,390						
Edenville	Midland	1938	Dundee	3,790	41.0	350	3,626	20,287	1,269,211	20
Edmore	Montcalm	1933	Traverse	3,150	43.2	90	5,314	9,364	478,263	7
Elba	Gratiot	1946	Traverse	2,440	47.0			8,444	27,808	4
Enterprise	Missaukee	1943	Detroit River	4,405		200	247	14,987	49,429	5
Essexville	Bay	1944	Dundee	2,835		1,460	696	241,833	1,016,728	35
Evart	Osceola	1942	Dundee	3,755		1,100	2,667	220,401	2,933,438	26
Fillmore	Allegan	1943	Traverse	1,525	41.1	650	1,051	77,895	683,112	51
Fork	Mecosta	1942	Dundee	3,845	50.1	2,550	2,339	751,763	5,964,849	58
			Detroit River	5,001	54.8					
Freeman	Clare	1938	Dundee	3,885		570	6,474	48,522	3,689,899	18
Fremont	Saginaw	1946	Dundee	3,125				82	2,000	0
Garfield	Clare	1946	Detroit Tiver	5,013				4,581	13,308	1
Geneva	Van Buren	1940	Traverse	1,010	31.5	110	483	5,798	53,096	7
Goodwell	Newaygo	1943	Traverse	2,760	43.0	1,240	782	36,830	969,287	8
Grout	Gladwin	1940	Dundee	3,825				1,764	34,2	0
Harrison	Clare	1945	Dundee	4,190	39.7			13,074	36,113	2
Hatton	Clare	1941	Dundee	3,945				6,045	135,692	2
Hawkhead	Allegan	1946	Traverse	1,105		140	326	9,301	45,639	7
Headquarters	Roscommon and Clare	1941	Traverse	3,380	42.3	1,600	4,189	168,847	6,702,435	33
			Detroit River	4,955	48.9					
Hilliards	Allegan	1944	Traverse	1,590		320	304	7,955	97,290	7
Hope	Barry	1939	Traverse	1,820	39.9	380	160	19,997	60,830	14
Hopkins	Allegan	1939	Traverse	1,635	41.5	70	1,944	3,788	136,087	3
Jerome	Midland	1947	Dundee	3,743				2,863	2,863	1

TABLE III—(*continued*)

Field	*County*	*Year of Discovery*	*Producing Formation*	*Depth to Pay (Feet)*	*API Gravity of Oil*	*Drilled Acreage*	*Recovery per Drilled Acre (Barrels)*	*Production in 1947 (Barrels)*	*Accumulative Production (Barrels)*	*No. of Prod. Wells Jan. 1 1948*
Kawkawlin	Bay	1938	Berea	1,505	38.0	4,010	1,049	724,752	4,208,182	181
			Dundee	2,830	35.0					
Kimball Lake	Newaygo	1947	Traverse	2,332		1,900	457	868,601	868,501	95
Lacota	Van Buren	1946	Traverse	1,000		60		2,927	31,229	0
Lakefield	Saginaw	1937	Dundee	3,185	39.0			953	10,362	1
Leaton	Isabella	1930	Dundee	3,655	43.0	1,090	3,240	123,754	3,531,414	39
Logan	Mason	1943	Sylvania	3,292	42.6			0	0	1
Monterey	Allegan	1938	Traverse	1,645	37.6	480	1,168	124,887	560,713	36
Mt. Forest	Bay	1947	Dundee	3,025		560	93	51,804	50,230	15
Mt. Haley	Midland	1934	Dundee	3,477	39.6			852	36,069	0
Mt. Pleasant	Isabella and Midland	1928	Dundee	3,545	41.8	4,200	5,522	232,727	23,193,227	173
Muskegon	Muskegon	1927	Traverse	1,700	37.4	2,800	2,432	14,941	6,809,407	33
			Dundee	2,025	32.0					
New Boston	Wayne	1943	Traverse	2,636				391	2,156	2
New Salem	Allegan and Ottawa	1938	Traverse	1,625	41.0	990	4,110	111,881	4,069,421	63
North Bangor	Van Buren	1942	Traverse	1,015	32.6	250	1,194	3,377	298,587	3
North Buckeye	Gladwin	1937	Dundee	3,615	39.0	2,750	5,824	173,581	16,016,078	137
North Hamilton	Clare	1943	Dundee	4,078				2,602	12,812	1
Otisville	Genesee	1941	Berea	1,500				5,692	13,888	7
			Traverse	1,895	44.3					
			Dundee	2,450	37.0					
Overisel	Allegan	1938	Traverse	1,490	42.1	1,600	1,523	54,731	2,437,437	58
Pinconning	Bay	1944	Dundee	2,898	36.2	50	2,330	27,836	116,498	2
Pine	Montcalm	1938	Traverse	2,836	45.0			4,009	57,780	1
Pine River	Gratiot	1942	Dundee	3,280				582	11,313	2
Polkton	Ottawa	1942	Traverse	1,890		60	156	3,129	9,335	3
Porter	Midland	1933	Dundee	3,415	40.6	4,330	8,159	411,612	35,327,928	216
Prosper	Missaukee	1942	Dundee	3,835	43.2	520	1,888	90,056	981,850	11
Redding	Clare	1938	Dundee	3,885	43.8	1,930	5,722	179,982	11,042,546	54
Reed City	Osceola and Lake	1940	Traverse	2,925		5,270	6,570	2,209,562	34,626,329	182
			Dundee	3,490						
			Detroit River	3,585	46.3					
Richfield	Roscommon	1941	Detroit River	4,180	43.4	680	573	50,239	389,859	16
Riverside	Missaukee	1942	Dundee	3,944	44.5			3,367	44,676	1
Rockford	Kent	1945	Traverse	2,230	44.0	170	1,351	115,006	229,626	16
Rose City	Ogemaw	1942	Detroit River	4,075	41.2	520	299	51,163	155,316	10
Rose Lake	Osceola	1943	Traverse	3,115	45.4	680	1,474	109,128	1,002,259	15
Saginaw	Saginaw	1925	Berea	1,825	46.1	1,500	987	15,185	1,479,926	28
Salem	Allegan	1937	Traverse	1,570	38.3	2,110	1,571	58,967	3,314,945	97
Sauble	Lake	1942	Traverse	2,145	35.6			7,783	86,866	4
Sec. 4, North Plains	Ionia	1947	Dundee	3,028				909	909	1
Sherman	Isabella	1936	Dundee	3,650	42.0	870	5,102	48,555	4,440,273	28
South Beaverton	Gladwin	1936	Dundee	3,845	41.1	340	2,082	50,023	708,007	22
South Buckeye	Gladwin	1936	Dundee	3,570	39.0	2,040	2,050	64,220	4,182,499	53
South Monterey	Allegan	1944	Traverse	1,660	40.0	150	690	6,096	103,559	9
South Salem	Allegan	1947	Traverse	1,679				1,151	1,151	1
South Tallmadge	Ottawa	1939	Traverse	1,826	38.6	620	886	44,923	549,251	57
Stony Lake	Oceana	1946	Traverse	1,630	44.9	1,160	363	419,187	421,651	29
Trowbridge	Allegan	1937	Traverse	1,355	41.2	570	388	4,720	221,124	6
Vernon	Isabella	1930	Dundee	3,755	44.1	830	5,657	41,201	4,695,513	15
Walker	Kent-Ottawa	1938	Traverse	1,850	40.0	5,035	2,110	244,564	10,621,477	361
Wayland	Allegan	1944	Traverse	1,810				1,522	5,778	3
West Beaverton	Gladwin	1943	Dundee	3,876				845	7,977	1
West Branch	Ogemaw	1933	Dundee	2,650	36.8	2,670	2,294	198,627	6,124,112	218
West Hopkins	Allegan	1941	Traverse	1,580	41.5	310	1,253	2,913	388,399	8
Wheatland	Mecosta	1945	Dundee	3,690	43.0			19,020	52,567	1
Winfield	Montcalm	1936	Dundee	3,340	43.2	50		1,046	58,836	4
Winterfield	Clare	1940	Traverse	3,105		1,000	3,971	147,553	3,971,394	28
			Dundee	3,770	44.2					
			Detroit River	5,015						
Wise	Isabella	1938	Dundee	3,700	45.2	1,500	1,797	165,248	2,694,857	56
Woodville	Newaygo	1943	Traverse	2,820		280	768	25,704	215,038	7
Wyoming Park	Kent	1939	Traverse	1,880	39.0	180	778	5,035	139,998	6
Yost-Jasper	Midland	1932	Dundee	3,420	40.6	2,010	3,945	182,316	7,929,503	75
Zeeland	Ottawa	1942	Traverse	1,495	41.9	680		16,254	249,755	10
Miscellaneous									293,770	9
Total State								16,215,613	273,161,875	3,532

EMMET
CHEBOYGAN
PRESQUE ISLE
CHARLEVOIX
ANTRIM
OTSEGO
MONT-MORENCY
ALPENA
LEELANAU
BENZIE
GRAND TRAVERSE
KALKASKA
CRAWFORD
OSCODA
ALCONA
Beaver Creek
Richfield
MANISTEE
WEXFORD
CADILLAC
MISSAUKEE
ROSCOMMON
OGEMAW
WEST BRANCH
IOSCO
MASON
LUDINGTON
LAKE
OSCEOLA
CLARE
GLADWIN
ARENAC
Sterling
(Unnamed)
Mt. Forest
Barton
Jerome
OCEANA
NEWAYGO
MECOSTA
ISABELLA
MIDLAND
BAY
HURON
Wheatland
MT. PLEASANT
BAY CITY
(Unnamed)
Cato
SAGINAW
TUSCOLA
SANILAC
Kimball Lake
MONTCALM
GRATIOT
SAGINAW
MUSKEGON
MUSKEGON
Turk Lake
(Unnamed)
OTTAWA
KENT
GRAND RAPIDS
IONIA
CLINTON
SHIAWASSEE
GENESEE
FLINT
LAPEER
PORT HURON
ST CLAIR
Overisel
South Salem
LANSING
ALLEGAN
BARRY
EATON
INGHAM
LIVINGSTON
OAKLAND
MACOMB
Algonac
PALLEGAN
Cheshire
DETROIT
BATTLE CREEK
ANN ARBOR
VAN BUREN
KALAMAZOO
CALHOUN
JACKSON
WASHTENAW
WAYNE
BERRIEN
CASS
ST JOSEPH
BRANCH
HILLSDALE
LENAWEE
MONROE
DEVELOPMENTS IN MICHIGAN
1947
LEGEND
OIL DISCOVERY
GAS DISCOVERY
FIELD EXTENSION
SCALE IN MILES
0 10 20 30 40 50 60

FIG. 1

TABLE IV

MICHIGAN GAS FIELDS

(January 1, 1948)

Field	*County*	*Year of Discovery*	*Producing Formation*	*Depth to Pay (Feet)*	*Drilled Acreage*	*Recovery per Drilled Acre (M. Cu. Ft.)*	*Production in 1947 (M. Cu. Ft.)*	*Accumulative Production (M. Cu. Ft.)*	*No. of Prod. Wells Jan. 1 1948*
Big Rapids	Mecosta	1943	"Mich. Stray"	1,145	1,440	621	440,110	804,435	7
Broomfield	Isabella	1930	"Mich. Stray"	1,355	5,040	1,959	567,101	9,871,036	43
Cedar	Osceola	1945	"Mich. Stray"	1,490	320	717	218,046	229,303	2
Clare City	Clare	1938	"Mich. Stray"	1,290	720	2,404	109,827	1,730,937	6
Clayton	Arenac	1936	Berea	1,180	1,440	3,549	121,578	5,111,048	20
Coldwater	Isabella	1945	"Mich. Stray"	1,390	2,400		1,901,117*	3,791,416*	15
Colfax	Mecosta	1945	"Mich. Stray"	1,240	640	623	84,640	398,544	3
Cranberry Lake	Clare-Missaukee	1943	"Mich. Stray"	1,295	6,840	921	1,903,613	6,300,299	57
Crystal	Montcalm	1935	"Mich. Stray"	1,000	320	2,219	20,977	710,047	4
Deep River	Arenac	1926	Berea	1,490	1,280	1,258	127,575	1,609,812	5
Deerfield	Isabella	1941	"Mich. Stray"	1,415	1,920	900	107,592	1,727,906	10
Douglas	Montcalm	1943	"Mich. Stray"	1,190	640	218	51,935	139,355	3
Edmore	Montcalm	1936	"Mich. Stray"	1,300	4,720		233,034	6,562,444*	17
Elba	Gratiot	1946	"Mich. Stray"	670	320	285	91,198	91,198	2
Evart	Osceola	1941	"Mich. Stray"	1,410	2,880		477,418*	2,917,445	17
Freeman	Clare	1938	"Mich. Stray"	1,475	2,040	2,029	505,078	4,138,324	10
Fremont	Isabella	1941	"Mich. Stray"	1,235	460	518	23,102	331,541	1
Garfield	Clare	1946	Detroit River	5,013	800		408,020*	759,628*	1
Gilmore	Isabella	1945	"Mich. Stray"	1,560	320	286	91,364	91,364	2
Goodwell	Newaygo	1943	"Mich. Stray"	1,135	2,800	1,808	1,890,295	5,061,888	40
Hamilton	Clare	1940	"Mich. Stray"	1,270	560	371	20,772	20,772	4
Harrison	Clare	1945	"Mich. Stray"	1,675	800	241	152,450	192,847	5
Headquarters	Roscommon	1946	"Mich. Stray"	1,340	1,200	867	104,051	104,051	8
Howell	Livingston	1935	Salina	3,920	1,440	2,123	305,724	305,724	9
Ithaca	Gratiot	1943	"Mich. Stray"	900	800	1,026	289,838	822,022	5
Lincoln	Clare	1938	"Mich. Stray"	1,530	2,520	3,939	2,795,707	9,926,149	39
Marion	Clare-Osceola	1940	"Mich. Stray"	1,370	10,400	1,795	3,285,482	18,668,611	171
Muskegon	Muskegon	1927	Trasverse and Dundee	1,640	1,200		13,389	7,189,638*	8
North Star	Gratiot	1940	"Mich. Stray"	870	160	1,290	27,545	206,390	1
Northwest Crystal	Montcalm	1936	"Mich. Stray"	1,075	160	564	25,939	90,159	1
Orient	Clare-Osceola	1945	"Mich. Stray"	1,508	1,720	3,476	597,911	597,911	15
Otsego	Otsego	1940	Antrim	1,385	320	95	30,321	30,321	2
Reed City	Osceola	1940	"Mich. Stray"	1,220	4,480		2,324,962*	20,707,427*	31
Richland	Montcalm	1940	"Mich. Stray"	1,205	960	935	181,001	897,158	2
Riverside	Missaukee	1940	"Mich. Stray"	1,435	2,720	1,219	357,612	3,315,626	12
Rolland	Isabella	1946	"Mich. Stray"	1,310	480		67,440	67,440	3
Salem	Allegan	1941	Salina	2,725			4,942	111,013	1
Shaver	Gratiot	1935	"Mich. Stray"	1,020	2,600	3,411	450,481	8,869,372	35
Sheridan	Mecosta	1935	"Mich. Stray"	1,375	320	787	953	251,749	3
Six Lakes	Mecosta-Montcalm	1934	"Mich. Stray"	1,270	9,840	4,817	1,574,291	47,396,034	98
South Tallmadge	Ottawa	1940	Berea of Southwest Michigan	1,030	320	752	1,697	240,761	2
Sylvan	Osceola	1941	"Mich. Stray"	1,525	320	252	2,001	80,714	1
Vernon	Isabella	1939	"Mich. Stray"	1,300	760	1,910	5,049	1,451,812	1
Walker	Kent	1940	Berea and Detroit River	1,150 2,250			33,082	4,171,750*	8
West Evart	Osceola	1943	"Mich. Stray"	1,480	2,080	451	113,896	939,067	10
West Fork	Mecosta-Osceola	1943	"Mich. Stray"	1,495	2,400	556	529,797	1,335,257	15
Winfield	Montcalm	1935	"Mich. Stray"	1,125	3,040	1,463	361,824	4,446,381	11
Wise	Isabella	1940	"Mich. Stray"	1,250	1,120	1,323	98,282	1,481,904	8
Woodville	Newaygo	1943	"Mich. Stray"	1,185	2,080	966	500,680	2,009,901	10
Miscellaneous							144,186	22,598,509	
Total State							23,954,925	210,994,440*	936

* Includes oil-well gas produced.

completion of a second well in this one-well field discovered in 1944. After several unsuccessful attempts to extend the field, the Swan-King Oil Company completed a good well on the narrowly confined but prolific producing zone which had been discovered by the Shell Oil Company.

TABLE V

EXPLORATORY WELLS, 1947[1]

Type of Well	Total Wells	Basis for Locating Well							Footage
		Surface Geology	Subsurface Geology	Trend	Core Drill	Seismograph	Non-Technical	Unknown	
New-field wildcats									
Successful	13		7		4		1	1	32,217
Dry	205	1	114	49	17	1	3	20	480,582
Totals	218	1	121	49	21	1	4	21	512,599
New-pool wildcats									
Successful	2		2						4,073
Dry	21		9	7			1	4	46,366
Totals	23		11	7			1	4	50,439
Deeper-pool tests									
Dry	9		4		5				11,734
Outposts									
Successful	7		3	2	2				17,682
Dry	23		14	7			1	1	47,550
Totals	30		17	9	2		1	1	65,232
All exploratory wells									
Successful	22		12	2	6		1	1	53,972
Dry	258	1	141	63	22	1	5	25	586,032
Totals	280	1	153	65	28	1	6	26	640,004
Success percentage	7.9	0.0	7.8	3.1	21.4	0.0	16.7	3.9	

[1] Data for table furnished by Glenn C. Sleight, Sun Oil Company, Mt. Pleasant, Michigan, member of the Committee on Statistics of Exploratory Drilling.

NATURAL GAS

Gas well completions during 1947 increased by 52 wells over 1946 to the total of 191 wells. Gas production for the year reached an all-time high of 23,954,925,000 cubic feet. Four new gas fields were discovered and one gas field was extended (Table II). The new gas fields were not significant since they added only 8 wells. Michigan had a total of 936 producible gas wells at the end of the year.

DEVELOPMENT

A large proportion of the new gas wells, 127 of the 191 completed, were facility wells. Facility wells are wells drilled for withdrawal or in-put purposes. They do not add to the reserves in those fields which have been designated storage reservoirs. The greatest facility well development, 76 wells, was in the Marion field, Clare and Osceola counties.

The Panhandle Eastern Pipe Line Company continued development of the Howell field in Livingston County by completing 8 wells for a total of 10 producible wells in the field. These wells have developed a total initial open-flow capacity of 34,000,000 cubic feet from a depth of 3,900–3,965 feet in a brown dolomite of the basal Salina formation. The field, now approximately 4 miles long and 1 mile wide, shows prospect of considerable expansion during the coming year.

Oil-well gas in the Kimball Lake field, Newaygo County, is being gathered

TABLE VI

IMPORTANT DEEP TESTS, 1947

County	*Well*	*Section Township Range*	*Permit Number*	*Total Depth (Feet)*	*Oldest Formation Penetrated*
Allegan	W. Lyons—Beilstein No. 1	22-3N-16W	12,950	2,185	Bass Island (Sil.)
Arenac	W. L. McClanahan—State Moffat No. 1	32-20N-3E	13,211	4,393	Sylvania (Dev.)
Arenac	D. Rayburn—State Adams No. 1	10-19N-3E	13,655	4,490	Sylvania (Dev.)
Crawford	Pure—State Beaver Creek No. A-1[1]	17-25N-4W	12,988	4,410	Detroit River (Dev.)
Huron	Pure Oil Co.—Elftman No. A-1	2-16N-10E	12,907	4,309	Sylvania (Dev.)
Lapeer	T. M. Pettigrew—McClellan No. 1	25-6N-11E	12,933	2,675	Bass Island (Sil.)
Mason	Walhalla Oil Co.—Thompson No. 1	26-18N-16W	13,274	3,197	Sylvania (Dev.)
Mecosta	C. W. Teater—Keilholtz No. 1	11-13N-8W	13,005	4,642	Sylvania (Dev.)
Montmorency	Beacom & Vegors—Carrier et al. No. 1	30-30N-4E	13,311	2,356	Sylvania (Dev.)
Oceana	Carter Oil Co.—Anthes No. 1	10-14N-17W	13,057	3,518	Niagaran (Sil.)
Oceana	Carter Oil Co.—M. Miller No. 2[2]	14-13N-18W	12,877	3,837	Niagaran (Sil.)
Oceana	D. M. Leonard—Jourtis No. 1	24-13N-17W	13,497	3,474	Salina (Sil.)
Oceana	Superior-Blamer Colfax No. 1	33-16N-15W	13,230	3,358	Sylvania (Dev.)
Osceola	Merrill Drlg. Co.—McLaughlin No. 1	34-18N-7W	12,913	5,144	Detroit River (Dev.)
Osceola	Ohio Oil Co.—Stedman No. 3[3]	29-18N-10W	12,802	5,030	Bass Island (Sil.)
Roscommon	J. O. Mutch—Hollowell No. 1	2-24N-1W	13,463	4,412	Sylvania? (Dev.)
Roscommon	Sun Oil Co.—Douglas No. 1	2-23N-2W	13,101	5,014	Sylvania (Dev.)
Washtenaw	H. L. Heath—Merritt et al. No. 1	1-1S-7E	13,154	3,220	Niagaran (Sil.)

[1] New-field discovery—Beaver Creek oil field.
[2] Deeper-pool test—Stony Lake oil field; dry in Niagaran, plugged back for Traverse oil well.
[3] Deeper-pool test—Reed City oil field.

and processed in a plant completed late in 1947. It is expected this project will recover 2 billion cubic feet of gas and an unestimated amount of condensate. This gas, which would have been lost if the plant had not been installed, is being transported to the Austin storage reservoir in Mecosta County.

EXPLORATION

The results from the exploratory wells drilled during 1947 are indicated in Table V.[3] The classification used is described by F. H. Lahee. Of the 280 exploratory wells drilled, 247 (88 per cent) were located by geological methods. These wells included 94 per cent of the successful wells. Only one well was located by seismograph and it was unsuccessful. Only 2 of the 32 wells located by nontechnical methods were successful.

Core-drill activity was greatly increased during 1947: 289 permits were issued, 103 more than in 1946. Most of the permits, 238, were issued for the very active Western district of Michigan. Little or no geophysical exploration work was done.

Deep-test drilling in the state was continued: 18 wells penetrated formations from the basal Detroit River formation to the Niagaran group (Table VI). The Beaver Creek oil field, Crawford County, was discovered by one of these exploratory wells. The deepest well ever drilled in Michigan was drilling ahead at 10,600 feet at the end of the year with no showings of oil or gas sufficient to warrant a test. This well, the Reinhardt No. 1, located in the West Branch oil field, Ogemaw County, was being drilled by the Ohio Oil Company and the Pure Oil Company. Jacob Beck's Sancrant No. 1, in Monroe County, was 1,000 feet in the "granite" and drilling ahead at 4,680 feet.

[3] Data for table furnished by Glen C. Sleight, Sun Oil Company, Mt. Pleasant, Michigan, a member of the Committee on Statistics of Exploratory Drilling.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 940-947, 1 FIG., 5 TABLES

DEVELOPMENTS IN NORTH MID-CONTINENT IN 1947[1]

J. ROBERT BERG[2]
Wichita, Kansas

ABSTRACT

In keeping with the national trend, oil development in Kansas was characterized by increases in almost every category of its exploratory program. Approximately 58 oil pools and 12 gas pools were named by the nomenclature committee of the Kansas Geological Society, some of which have since been combined with previously existent pools. Although many of these discoveries were outpost or new-pool discoveries, there were ten new-field or "rank wildcat" discoveries. Rooks County was outstanding because of the marked wildcat activity in this area, which resulted in nine pool discoveries.

There were no important developments and very little drilling in the states of Iowa, Nebraska, and Missouri this year.

Kansas produced slightly more than 106,000,000 barrels of oil and casinghead gasoline during 1947, as compared with the 1946 production of 98,000,000 barrels. Gas production amounted to 180,000,000,000 cubic feet as compared with the 1946 production of 143,000,000,000 cubic feet.

The 1947 dry-hole percentage of 34.7 per cent is only slightly higher than the 1946 figure of 32.2 per cent, although there were almost 900 more wells drilled in 1947 than in 1946.

INTRODUCTION

The area covered in this report includes the states of Kansas, Nebraska, Missouri, and Iowa. However, activity in all of these states except Kansas was at an absolute minimum during the past year. The part of western Kansas covered by the Wichita scouts in their check meetings is largely the area within the scope of this paper and is essentially the area covered by reports of previous years.

KANSAS

DRILLING ACTIVITY

Drilling activity in Kansas in keeping with the national trend was greatly accelerated during the past year, with an increase from 1,942 total completions in 1946, to 2,845 completions in the year 1947. The impetus for this increase in drilling activity was undoubtedly influenced by the increase in the price of oil, which encouraged the expenditure of risk capital for both pool development and wildcat drilling. The net result of the total increase indicates a slightly lower percentage of oil wells drilled, and an increase in the percentages of dry holes and gas wells. Comparative figures for the past 3 years are shown in Table I.

TABLE I

SUMMARY OF DRILLING OPERATION, 1945–1947

	1947	*Percentage*	*1946*	*Percentage*	*1945*	*Percentage*
Oil wells	1,407	49.4	1,029	53.0	659	44.5
Gas wells	450	15.8	286	14.8	208	14.0
Dry holes	988	34.8	627	32.2	615	41.6

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, April 9, 1948.

[2] Associate professor of geology, University of Wichita.

Contrary to the trend of the past 6 years, productivity of new oil-well completions increased slightly for the year 1947, from 362 barrels average potential for 1946, to 402 barrels average potential for 1947. This increase and lack of the usual decline evidenced in several previous years was largely because of the higher potentials of some of the 1947 discoveries, notably the Ash Creek pools, the Burnett pool extensions, and the several discoveries in Rooks County, including the promising Paradise Creek pool. These discoveries are discussed in more detail under the heading of new pools. However, these discoveries were on the Central Kansas uplift, in definitely proved oil country, and there were no outstanding discoveries in rank wildcat country. Comparative figures are shown in Table II.

TABLE II

PRODUCTIVITY ADDED, 1941–1947

Year	*Oil Wells*	*Potential Bbls. Oil*	*Potential Bbls. Avg.*	*Gas Wells*	*Capacity MCF*	*Avg. Capacity MCF*
1941	1,253	1,727,593	1,379	75	797,011	10,626
1942	713	788,193	1,106	89	610,769	6,862
1943	796	716,777	900	30	320,420	10,681
1944	716	481,315	672	90	1,255,123	13,946
1945	659	298,390	453	208	2,957,170	14,217
1946	1,029	372,485	362	286	3,261,500	11,400
1947	1,407	564,936	402	450	4,115,000	9,144

Gas production added during 1947 totaled approximately 4,115,000,000 cubic feet.

PRODUCTION

At the end of the year 1947, the accumulative production of Kansas was 1,779,101,000 barrels of oil, or 5.07 per cent of the accumulative total for the United States. The oil production for Kansas during the year 1947 of approximately 106,000,000 barrels (according to United States Bureau of Mines statistics) is 5.67 per cent of the national total for 1947. Hence, Kansas still remains an important source of national oil production, and retained fifth place in the national picture, which it has held for the last 5 years.

Compared with the all-time high of 108,441,648 barrels of oil produced in the year 1943, production for 1947 was 106,060,019 barrels; for 1946 the total was 98,193,272 barrels; and for 1945, the total was 98,429,869 barrels. According to figures released by the State Corporation Commission, gas production for 1947 totaled approximately 180,000,000,000 cubic feet, as compared with the 1946 total of 143,005,164,000 cubic feet of gas.

Income from the oil and gas industry in Kansas reached an all-time high in 1947, approximately $223,000,000 in comparison with the income for 1946 of $148,000,000. Income from the 106,000,000 barrels of oil and casinghead gasoline accounted for almost $200,000,000, whereas the 180,000,000,000 cubic feet of gas

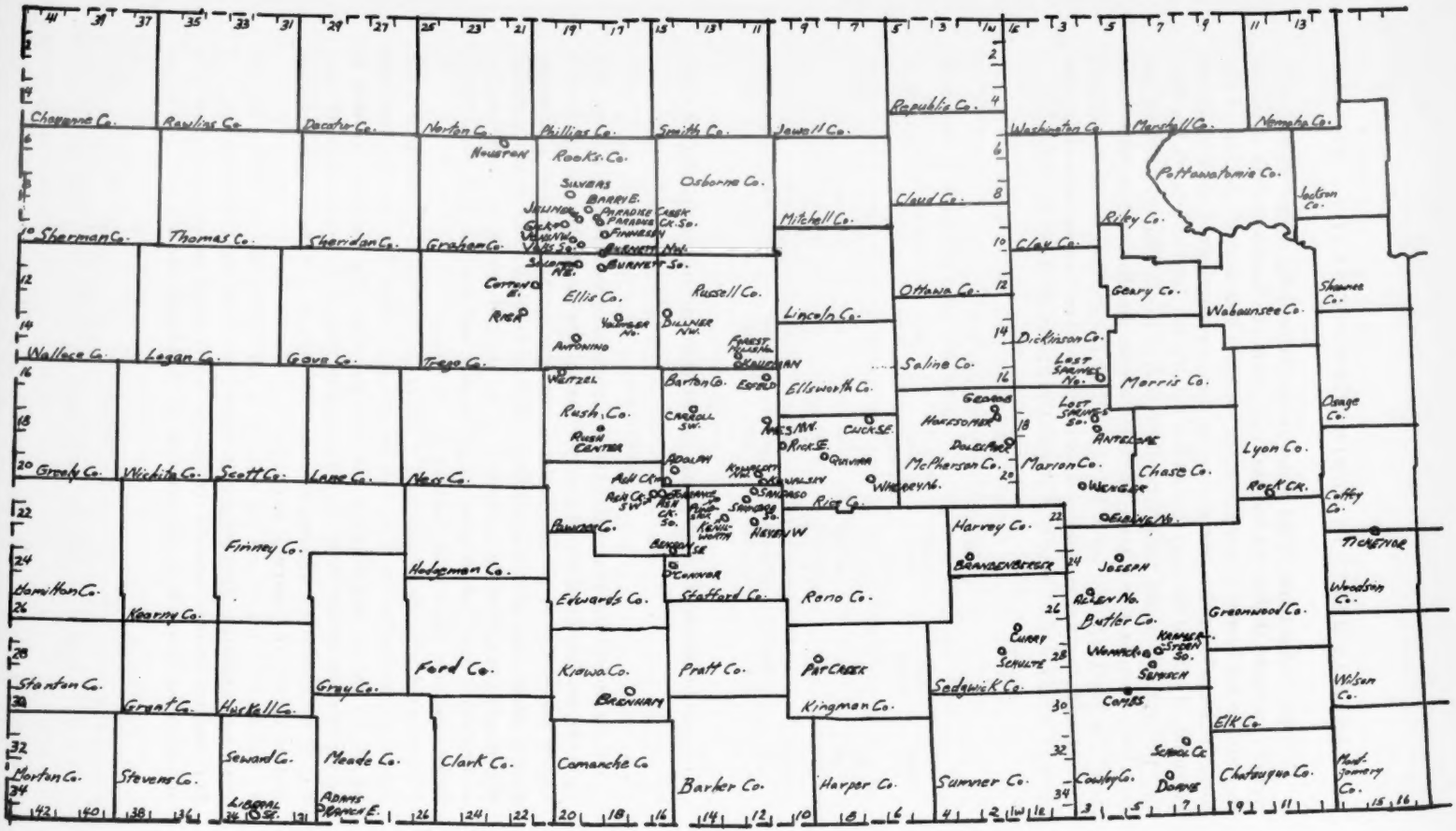

FIG. 1.—State of Kansas, 1947 oil and gas pool discoveries.

produced accounted for approximately $10,800,000, and lease rentals and bonuses brought an additional income of $10,000,000.

Average oil production per day for Kansas for the year 1947 was 287,807 barrels. Daily production reached a maximum during the week of October 20, when runs averaged 311,092 barrels per day. The average passed the 300,000-barrel mark 3 other weeks during the year. Allowable production for Kansas was 270,000 barrels for the first 3 months of 1947; 275,000 barrels in April; 280,000 barrels in May; 285,000 barrels in June; and for the last 6 months of the year was set at 290,000 barrels per day.

The total potential of all wells in the state as of January 1, 1948, was 2,835,651 barrels, having declined from the January 1, 1947, figure of 3,258,296 barrels, and the January 1, 1946, figure of 3,805,107 barrels. The all-time high potential of 8,201,960 barrels was established in March, 1942. Although the production decline figures appear alarming on the surface, it is true that the curve is flattening, and the decrease is becoming less each year.

The six most active counties responsible for 54 per cent of the total well completions in the state included Barton, Butler, Ellis, Russell, Rice, and Rooks, respectively, in decreasing order of number of completions. Of these more active counties, Russell shows the lowest dry-hole percentage of 28 per cent, and Rooks County shows the highest dry-hole percentage of 47 per cent. Average depth drilled was 3,271 feet for oil wells, 2,833 feet for gas wells, 3,434 feet for dry holes, and an over-all average depth for all wells in the state of 3,252 feet. A new depth-drilling record for Kansas was set in the year 1947, when the discovery well of the Liberal Southeast gas pool was drilled to the total depth of 8,243 feet.

FIG. 1.—State of Kansas, 1947 oil and gas pool discoveries.

EXPLORATORY DRILLING
(Wildcat activity)

Exploratory drilling increased in Kansas in the year 1947, although the increase was not in the category of new-field or rank wildcats; statistically there was a decrease of approximately 32 per cent in the new-field category from the total of 1946. The drilling of outpost or extension wells decreased only very slightly, whereas the marked increase in total exploratory wells drilled was in the category of new pools. The over-all total of exploratory wells drilled is 534 wells in 1947 in comparison with 430 wells in 1946. The classification of tests drilled with respect to oil, gas, or dry holes, and their exploratory footage is shown in Table III. Total exploratory footage reached an all-time high of 1,896,481 feet, after the decline of the past few years.

Table IV indicates the figures for drilling of field and pool wildcats for 1947 in comparison with previous years. Although the table indicates a sizable increase in the number of oil and gas wells, dry holes, exploratory footage, *etc.*, in comparison with previous years, the tests appear less venturesome than in comparison with previous years. An analysis of the figures in Table IV indicates that after the marked increase in average depth for oil and gas wells in 1943 over 1942,

TABLE III

EXPLORATORY STATISTICS FOR KANSAS, 1947

Class	*Total*	*Oil*	*Feet*	*Gas*	*Feet*	*Dry*	*Feet*	*Footage Total*
New field	155	7	27,305	5	22,820	143	434,462	584,587
New pool	277	48	156,511	8	31,622	221	771,242	959,375
Outpost	99	25	85,525	3	9,295	71	247,060	341,880
Shallower pool	3	3	10,639					10,639
Deeper pool								
Totals	534	83	279,980	16	63,737	435	1,552,764	1,896,481

there has since been a steady decline, in the average depth drilled. However, in the more rank or new-field classification the average total depth for the year 1947, was 3,680 feet as compared with the 1946 figure of 3,602 feet. Hence, the seemingly lower figure for average depths drilled is largely because of the smaller percentage of new-field tests and the larger percentage of new-pool tests for 1947 in comparison with 1946.

TABLE IV

EXPLORATORY WELLS, 1940–1947

Year	*Oil and Gas Wells*	*Total Feet*	*Dry Holes*	*Total Feet*	*Total Wells*	*Total Feet*
1940	23	75,142	122	408,887	145	484,c20
1941	37	140,284	290	688,189	327	828,473
1942	34	122,041	299	1,039,753	333	1,161,794
1943	57	199,532	379	1,416,605	436	1,616,137
1944	66	256,376	428	1,586,558	494	1,842,737
1945	39	141,999	326	1,204,832	365	1,346,831
1946	35	126,154	279	1,004,900	314	1,131,054
1947	68	238,258	364	1,305,704	432	1,543,962

The more active counties as shown by the total number of completions of wildcat wells in Kansas for the year 1947 were as follows: Rooks, 58; Butler, 41; Ellis, 36; Barton, 33; Stafford, 27; Graham, 25; Marion, 17; Rush, 14; McPherson and Rice, 13; Pawnee and Barber, 12.

Of these more active counties (which includes those with twelve or more wildcat tests completed during 1947) the following data indicate the percentage successful in order: Pawnee, 41 per cent; Rice, 31 per cent; Marion, 28 per cent; McPherson, 23 per cent; Rush 21 per cent; Russell, 20 per cent; Stafford, 19 per cent; Barton, 18 per cent; Ellis and Butler, 17 per cent; Rooks, 15.5 per cent.

NEW POOLS

Table V lists the new pools in western and eastern Kansas as named by the nomenclature committee of the Kansas Geological Society. Six of the discoveries listed are revivals of old pools and are so indicated. Two of the pools listed have

TABLE V

WESTERN KANSAS OIL AND GAS POOLS, 1947

Pool	*County*	*Sec.-T.-R.*	*T.D. Ft.*	*Prod. Fm.*	*Exploration Method*	*Potential (Bbls. Oil) (MCF Gas)*
Adams Ranch E.	Meade	26-34-30W	6,434	Miss. lime	Core-drill	2,860 gas
Adolph	Barton	16-20-15W	3,763	Arbuckle	Subsurface	10,200 gas
Ames NW	Barton	9-18-11W	3,318	Arbuckle	Subsurface	173 oil
Antonino (rev.)	Ellis	27-14-19W	3,718	Arbuckle	Subsurface	132 oil
Ash Creek	Barton	31-20-15	3,850	Arbuckle	Seismic	477 oil
Ash Creek So.	Pawnee	12-21-16	3,790	Arbuckle	Subsurface	272 oil
Ash Creek SW	Pawnee	11-21-16	3,789	Arbuckle	Seismic	2,197 oil
Barry East	Rooks	6- 9-18	3,498	Arbuckle	Core-drill	809 oil
Benson SE	Pawnee	32-23-15	4,023	Arbuckle	Seismic	23,800 oil
Brandenberger	Harvey	12-24- 3	3,878	Viola	Seismic	25 oil
Brenham	Kiowa	29-28-17	5,159	Miss. lime	Core-drill	7,300 gas
Burnett NW	Ellis	3-11-18	3,624	Arbuckle	Subsurface	3,000 oil
Burnett So.	Ellis	25-11-18	3,624	Arbuckle	Subsurface	3,458 oil
Carroll SW	Barton	32-17-14	3,473	Lansing-K.C.	Subsurface	180 oil
Click SE	Rice	11-18 -7	3,487	Lansing-K.C.	Subsurface	25 oil
Cotton East	Trego	14-12-21	3,904	Arbuckle	Core-drill	125 oil
Curry (rev.)	Sedgwick	11-27- 1	2,740	Kansas City	Subsurface	72 oil
Dillner NW	Russell	27-13-15	3,337	Arbuckle	Subsurface	39 oil
Doles Park	McPherson	12-19 -1	2,843	Miss. lime	Subsurface	283 gas
Esfeld	Barton	15-16-11	3,358	Arbuckle	Subsurface	138 oil
Finnessy	Rooks	14-10-18	3,763	Lansing-K.C.	Core-drill	25 oil
Forest Hill No.	Russell	20-15-12	3,283	Arbuckle	Subsurface	25 oil
Georob	McPherson	31-17- 1	2,688	Miss. lime	Subsurface	160 oil
Gick	Rooks	30- 9-19	3,590	Arbuckle	Core-drill	611 oil
Heyen West	Stafford	23-22-12	3,678	Arbuckle	Subsurface	1,842 oil
Hoffsomer	McPherson	6-18- 1	2,772	Miss. lime	Subsurface	215 oil
Houston	Graham	9- 6-22	3,873	Lansing-K.C.	Subsurface	297 oil
Jelinek	Rooks	23- 9-19	3,552	Arbuckle	Seismic	2,292 oil
Kaufman	Russell	33-15-12	3,318	Arbuckle	Subsurface	74 oil
Kenilworth	Stafford	15-22-13	3,801	Lansing-K.C.	Subsurface	307 oil
Kowalsky (rev.)	Barton	32-20-11	3,374	Arbuckle	Seismic	458 oil
Kowalsky NW	Barton	30-20-11	3,390	Arbuckle	Subsurface	994 oil
Liberal (rev.)	Seward	33-34-34; 3-35-34	?	Chase group	Subsurface	? gas
Liberal SE	Seward	15-35-33	8,243	Penn. sand	Core-drill	4,970 gas
O'Connor	Stafford	16-24-15	4,068	Arbuckle	Subsurface	26,000 gas
Paradise Ck.	Rooks	21- 9-18	3,589	Arbuckle	Subsurface	1,470 oil
Paradise Ck. So.	Rooks	28- 9-18	3,601	Lansing-K.C.	Subsurface	351 oil
Pat Creek	Kingman	20-28- 9	4,411	Viola	Subsurface	1,604 oil
Pundsack	Stafford	19-21-13	3,743	Arbuckle	Seismic	89 oil
Quivira	Rice	36-19- 9	2,187	Tarkio	Subsurface	3,445 gas
Rick SE	Rice	18-19-10W	3,337	Arbuckle	Subsurface	376 oil
Riga (rev.)	Trego	20-13-21	3,938	Sooy cgl.	Subsurface	138 oil
Rush Center	Rush	16-18-18	3,851	Arbuckle	Subsurface	122 oil
Sandago	Stafford	12-21-12	3,515	Arbuckle	Subsurface	363 oil
Saundra So.	Stafford	22-21-12	3,604	Arbuckle	Non-technical	90 oil
Schulte (rev.)	Sedgwick	7-28- 1	3,663	Simpson	Subsurface	2,955 oil
Silvers	Rooks	21- 8-19	3,473	Arbuckle	Subsurface	249 oil
Solomon NE	Ellis	22-11-19	3,643	Arbuckle	Subsurface	323 oil
Torrance	Pawnee	19-21-15	3,857	Arbuckle	Subsurface	53,476 gas
Vohs NW	Rooks	9-10-19	3,771	Lansing-K.C.	Subsurface	771 oil
Vohs So.	Rooks	23-10-19	3,605	Lansing-K.C.	Subsurface	82 oil
Weitzel	Rush	1-16-20	3,674	Lansing-K.C.	Seismic	673 oil
Wherry No.	Rice	35-20- 7	3,426	Sooy cgl.	Subsurface	67 oil
Younger No.	Ellis	32-13-17	3,598	Arbuckle	Subsurface	100 oil
		EASTERN KANSAS OIL AND GAS POOLS, 1947				
Allen No.	Butler	36-25- 3E	2,723	Miss. lime	Subsurface	25 oil
Antelope	Marion	33-18- 4	2,442	Miss. lime	Subsurface	25 oil
Combs	Cowley	5-30- 5	2,852	Bartlesville	Subsurface	50 oil
Doane	Cowley	36-33- 6	3,143	Miss. lime	Subsurface	25 oil
Elbing No.	Marion	27-22- 4	2,448	Miss. lime	Subsurface	100 oil
Joseph	Butler	18-24- 5	2,503	Miss. lime	Subsurface	15 oil
Kramer-Stern So.	Butler	15-28- 6	3,038	Viola	Subsurface	35 oil
Lost Springs NE	Dickinson	26-16- 4	2,345	Miss. lime	Subsurface	100 oil
Lost Springs So.	Marion	16-18- 4	2,445	Miss. lime	Subsurface	35 oil
Rock Creek	Lyon	32-21-11	1,942	Bartlesville	Subsurface	35 oil
School Creek	Cowley	15-32- 7	2,945	Miss. lime	Subsurface	25 oil
Semisch	Butler	4-29- 6	2,826	Bartlesville	Subsurface	50 oil
Tichenor	Woodson	24-23-15	1,488	Miss. lime	Non-technical	1,000 gas
Wenger	Marion	11-21- 3	2,782	Hunton	Non-technical	50 oil
Womack	Butler	19-28- 6	3,199	Bartlesville	Subsurface	2,000 gas

since been combined by the nomenclature committee with previously discovered pools; these latter include Burnett South which was combined with Burnett, and Paradise Creek South which was combined with the Paradise Creek pool.

Barton and Pawnee Counties.—One of the outstanding discoveries of the year was the Ash Creek pool in southwestern Barton County, and its extensions in Pawnee County, the Ash Creek South and Ash Creek Southwest pools. The original discovery was on the basis of seismic data, and the test was drilled by the Bay Petroleum Company. Initial potentials of the discovery wells were (1) 477, (2) 272 and (3) 2,197 barrels of oil per day, respectively, all from the Arbuckle dolomite of Ordovician age.

Graham County.—Although the discovery of the Houston pool in Graham county was not outstanding (nor has subsequent development shown it to be so, because of the offset dry hole which has since been drilled) it is important from the standpoint of being in the far northwest area of Kansas, and may furnish impetus to further exploration of this area on the Central Kansas uplift. Initial potential of the discovery well was 297 barrels of oil per day from the Lansing-Kansas City groups of the Pennsylvanian system.

Rooks and Ellis Counties.—Rooks County was the most active exploratory area in Kansas during the past year, 58 wildcat tests having been drilled in this county; this exploration resulted in the discovery of nine oil pools or the largest number of pools discovered of any county in Kansas. However, on a percentage basis, Rooks County shows one of the poorest records of the more active exploratory counties; its record indicates that 15.5 per cent of the exploratory tests were successful, eight other counties showing better percentage records. It is perhaps encouraging, however, that the average potential per well discovered for Rooks County was 718 barrels of oil per day, the third best record in Kansas on this basis, being exceeded only by Ellis and Pawnee counties.

Of the nine oil pools discovered in Rooks County during the year 1947, three are outstanding, including the Barry East pool, the Jelinek pool, and the Paradise Creek pool, the latter also having had a promising extension in the Paradise Creek south pool. The Barry East pool, drilled by the Continental Oil Company on the basis of core-drill information was completed with an initial potential of 609 barrels of oil per day, from the Ordovician Arbuckle dolomite.

The Jelinek pool drilled by the Derby Oil Company on the basis of seismic information was completed with an initial potential of 2,292 barrels of oil per day from the Ordovician Arbuckle dolomite.

The Paradise Creek pool drilled by W. L. Hartman on the basis of subsurface information was completed with an initial potential of 1,470 barrels of oil per day from the Ordovician Arbuckle dolomite.

Seward County.—The Stanolind Oil and Gas Company drilled the deepest test in Kansas to set a new record, which resulted in a gas discovery with a potential of 4,970,000 cubic feet of gas per day. The record total depth is 8,243

feet, although the producing zone is a Pennsylvanian sand at the depth of 6,202 feet, which is also the deepest producing zone in Kansas.

GEOPHYSICAL ACTIVITY

An analysis of all the wildcats drilled in Kansas indicates that the subsurface method of location or basis for drilling these exploratory holes is the most popular and also the most successful method in Kansas; however, geophysical activity shows a definite increase for the year 1947 over 1946. The data on all exploratory tests indicate that the subsurface method was 22 per cent successful, the core-drill method was 21 per cent successful, seismic locations were 13 per cent successful, and non-technical or chance locations were 4 per cent successful.

Comparative figures on geophysical activity in Kansas for the years 1947 and 1946 show six geophysical parties (four seismic and two gravimetric) in operation in 1947, to one geophysical party in operation in 1946 (seismic). However, core-drill activity decreased from seven parties in 1946 to five parties in 1947.

ENGINEERING DEVELOPMENTS

The only marked technological development affecting Kansas in the year 1947 is the development by the Stanolind Oil and Gas Company and the Layne-Wells organization of a new gas potential meter for use in the Hugoton gas field.

NEBRASKA-IOWA-MISSOURI

In the three states of Nebraska, Iowa, and Missouri, activity declined considerably from the activity of 1946. As far as is known there were no oil or gas tests drilled in Iowa either in 1946 or 1947. During 1946, there were six wildcat tests drilled in Missouri, and five wildcat tests drilled in Nebraska; in comparison during the year 1947, there were two wildcat tests drilled in Nebraska and only one wildcat test in Missouri. The latter test, a chance location was drilled to the total depth of 1,601 feet in the Hunton formation of Devonian age, and was found dry and abandoned. Of the wildcat tests in Nebraska, the Evans *et al.* Wilcox No. 1, Sec. 32, T. 3 N., R. 29 W., was dry and abandoned at the total depth of 2,183 feet; and the Banner Oil Company's Lorercheck No. 1, Sec. 27, T. 19 N., R. 57 W., was dry and abandoned at the total depth of 6,788 feet.

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DEVELOPMENTS IN OKLAHOMA IN 1947[1]

DEAN C. WELLMAN[2]
Oklahoma City, Oklahoma

ABSTRACT

While activity throughout Oklahoma increased, new geologic significance and impetus to further exploration resulted from successful wildcatting, especially in the southeastern Anadarko basin and flanks of bordering uplifts where additional accumulations of oil were discovered in Pennsylvanian, Hunton, and Simpson formations, and in the Ardmore basin where additional Springer sandstone reserves were found. While noteworthy discoveries were made elsewhere, their importance in terms of reserves was less certain at the close of the year.

Production of oil increased to 141,445,630 barrels, representing an increase of 3.3 per cent over the 1946 production. Reserves of oil increased by 6.1 per cent. Production of marketed natural gas increased to 404,843,389,000 cubic feet, or 7.1 per cent over that marketed in 1946. Total reserves of natural gas increased by 5.7 per cent.

The deepest man-made hole in the world was completed in Oklahoma during 1947 at the total depth of 17,823 feet. In number of holes drilled, Oklahoma ranked second with a total of 3,977, of which 904 were wildcats resulting in 147 new discoveries.

INTRODUCTION

The area here reviewed includes the entire state of Oklahoma. An attempt has been made to condense the material as much as possible; salient data relating to successful exploratory tests are presented in Table II, with a more extended description of a few of the outstanding discoveries.

DEVELOPMENT

Exploration, production, and exploitation continued at a high level in Oklahoma during 1947, in many respects exceeding all previous records. In total number of holes drilled, Oklahoma ranked second, being surpassed only by Texas. Holes drilled in all categories total 3,977, of which 1,926 were productive pool wells and 904 wildcats, resulting in 147 new discoveries (excluding ordinary extensions), with a discovery ratio of 16.2 per cent. Significant wildcat discoveries were made in scattered parts of the state, and attention continued to be focused on stratigraphic as well as structural traps. Due in part to increases in the price of crude oil, many areas were being carefully rechecked for additional producing zones, and prospects drilled that earlier appeared marginal. This condition is largely responsible for the exceptional number of extension and new-zone discoveries shown in Table I.

Production of oil increased to 141,445,630 barrels,[3] 3.3 per cent over the 1946 production, maintaining its position of fourth ranking state. Proved reserves of crude oil in new pools discovered in 1947 were 82,302,000 barrels,[4] placing Okla-

[1] Presented by title before the Association at Denver, April 25–30, 1948. Manuscript received, April 22, 1948.

[2] Shell Oil Company. The assistance of others in furnishing data, and in proofreading, is acknowledged and appreciated.

[3] Oil production statistics from Oklahoma Corporation Commission.

[4] Oil reserve statistics from American Petroleum Institute.

homa second in this category. Total reserves added were 196,759,000 barrels, bringing the total net reserves at the close of 1947 to 952,990,000 barrels. This represents an increase of 6.1 per cent over estimated reserves at the close of 1946.

Production of marketed natural gas increased to 404,843,389,000 cubic feet[5] in 1947, an increase of 7.1 per cent over the gas marketed in 1946. Total reserves increased to 11,350,864 million cubic feet,[6] 5.7 per cent over reserves estimated at the close of 1946.

NEW FIELDS DISCOVERED

Among the 147 new discoveries of 1947, some were of major geologic significance with resulting impetus to further exploration of large areas. Only a few resulted in the addition of very large reserves either in new fields or new producing zones.

TABLE I

COMPARISON OF WELLS DRILLED, 1941–1947

	Total	*Oil*	*Gas*	*Exploratory Tests*			*Total*	*All Others*
				Dry	*Extension*	*New Formation*		
1947	3,977	73	33	708	49	41	904	3,073
1946	3,119*	71	22	474	18	3	588	2,531
1945	2,351*	51	22	301	32	12	418	1,933
1944	1,890	36	8	244	30	27	345	1,545
1943	1,187	34	10	254	23	15	336	851
1942	1,191	32	7	178	21	15	253	938
1941	2,162	39	2	190	13	27	271	1,891

* Total number of wells drilled in 1945 and 1946 from *Oil Weekly*.

Southeastern Anadarko basin.—The most active exploratory efforts in Oklahoma occurred in the southeastern Anadarko basin, referred to by some geologists as the Southeastern embayment (including Elmore embayment) and popularly called the Golden Trend. New reserves were added by seventeen new field and new zone discoveries in stratigraphic and structural traps occurring in the Pennsylvanian, Hunton, and Simpson formations, lying between the Arbuckle, Pauls Valley, and Nemaha-Oklahoma City uplifts and the deeper part of the basin on the west. Most significant from the standpoint of reserves were the new discoveries of oil accumulations in truncated Pennsylvanian (Deese) sandstones and the extensions to previously discovered fields in these zones, although several Hunton and Simpson discoveries were spectacular in initial production.

Ardmore basin.—Following a trend beginning in 1944 with the discovery of Springer sandstone production on the east flank of the Velma anticline, exploration in the Ardmore basin during 1947 was focused on the search for new Springer accumulations within and adjacent to older fields developed in stratigraphically

[5] Gas production statistics from Gross Production Tax Division, Oklahoma Tax Commission.

[6] Gas reserve statistics from American Gas Association.

TABLE II
DISCOVERIES AND EXTENSIONS IN 1947

NO.*	OPERATOR	FARM	LOCATION	COUNTY	COMPLETION DATE	TOTAL DEPTH	PRODUCING FORMATION	TOP, PROD. FORMATION	INITIAL POTENTIAL	FIELD NAME	CLASS
1	Hunt	Light #1	9-6N-21ECM	Beaver	2-13-47	6960	Miss. Ls.	6225	50 Bbls. 6.8 Mil.	Light	New
2	Shell Oil	Walters #1	14-10N-21W	Beckham	11-18-47	13,133	Penn.	9260	470 Bbls.	Elk City	New
3	Grayhill	Wets-le-line #1	34-6N-12W	Caddo	5-13-47	845	Perm.	760	1 Bbl.	-	New
4	Gibson	Smith #1	14-5S-1W	Carter	4-1-47	4566	Penn.	4134	105 Bbls.	West Brock	New
5	Gibson	Sarasota "A" #1	14-5S-1W	Carter	10-14-47	4358	Penn.	4098	396 Bbls.	West Brock	New Fm.
6	Faultline	School Land #1	36-10N-2W	Cleveland	11-18-47	7406	Simpson	7128	240 Bbls.	E. Moore	New
7	Travelsteud	Ziegler #1-A	33-3N-10W	Comanche	1-14-47	583	Perm.	576	2.5 Mil	-	New
8	Texola	Tas-Saw	24-4N-11W	Comanche	4-29-47	1761	Simpson	1740	8.4 Mil	N. Fort Sill	New
9	Duncan	Jones #1	24-2S-11W	Cotton	11-25-47	1887	Penn.	1878	60 Bbls.	-	New
10	Martin	Dyer #1	33-2S-11W	Cotton	1-21-47	1656	Penn.	1631	70 Bbls.	N. Soldier Creek	New
11	Fisher	Bates #1	17-3S-11W	Cotton	1-21-47	1582	Penn.	1560	15 Bbls.	S.W. Soldier Creek	New
12	Gandy, et al	Taylor #1	34-3S-11W	Cotton	1-21-47	1448	Penn.	1445	70 Bbls.	W. Cache Creek	New
13	Akin, et al	Shaw #1	28-3S-11W	Cotton	2-25-47	1525	Penn.	1518	70 Bbls.	N. Rose Valley	New
14	Burton	Pahdi #1	24-3S-12W	Cotton	2-25-47	1492	Penn.	1483	144 Bbls.	E. Cookietown	New
15	Midland	Copher #1	18-3S-11W	Cotton	3-18-47	1557	Penn.	1555	75 Bbls.	E. Cookietown	Ext.
16	Phillips	Tollett #1-A	7-3S-11W	Cotton	5-20-47	1559	Penn.	1551	49 Bbls.	W. Soldier Creek	New
17	Ross, et al	Dugan #1	5-5S-12W	Cotton	5-13-47	1591	Penn.	1578	40 Bbls.	S. Randlett	New
18	Akin & Dimock	Brown #1	21-3S-11W	Cotton	6-17-47	1563½	Penn.	1550	12 Bbls.	N. Rose Valley	Ext.
19	Phillips	Tah-Tah-Dar-Sy #1	33-3S-11W	Cotton	6-3-47	1508	Penn.	1496	53 Bbls.	-	New
20	Barbe, et al	Smith #1-A	8-3S-11W	Cotton	7-8-47	1598	Penn.	1594	108 Bbls.	E. Cookietown	Ext.
21	Nixon, et al	#1 Warren	1-5S-13W	Cotton	7-22-47	1623	Meg.	1596	12 Bbls.	S.W. Randlett	N.Fm.
22	Amerada	Per-man-su #1	35-3S-11W	Cotton	8-5-47	1413	Penn.	1402	4 Bbls.	-	New
23	Duncan, et al	Fitzsimmons #1	23-2S-11W	Cotton	10-21-47	1885	Penn.	1875	100 Bbls.	Walters Townsite	New
24	Bridwell	Witt #1	17-4S-10W	Cotton	11-12-47	1259	Penn.	1252	8 Bbls.	-	New
25	Kingery, et al	Starr #2	8-3S-11W	Cotton	12-9-47	1612	Penn.	1601	20 Bbls.	Soldier Creek	Ext.
26	Bridwell	Ko-Part #1	25-3S-11W	Cotton	1-28-47	1482	Penn.	1447	16 Bbls.	N. Cache Creek	New
27	Ross	Alexander #1	7-5S-12W	Cotton	6-24-47	1572	Penn.	1565	22 Bbls.	S.W. Randlett	New
28	Cohen	Jenson #1	27-2S-11W	Cotton	7-1-47	1882½	Penn.	1865	2 Bbls.	-	New
29	Deep Rock, et al	Koch #1	15-15N-7E	Creek	1-1-47	3968	Simpson	3932	100 Bbls.	-	New
30	S.S.C.	Gibson #1	26-15N-10E	Creek	6-24-47	3018	Misener	3013	21 Bbls.	-	New
31	Anderson, etal	Abraham #1	29-14N-9E	Creek	10-21-47	3324	Tanneha	3135	8 Bbls.	-	New
32	Murta, et al	Luker #1	8-16N-11E	Creek	10-7-47	2288	Dutcher	2280	86 Bbls.	-	N.Fm.
33	Bates, et al	Fulsom #1	13-15N-8E	Creek	12-2-47	3800	Dutcher	3120	7.8 Mil	-	New

Discoveries and Extensions in 1947 (Cont'd)

NO.	OPERATOR	FARM	LOCATION	COUNTY	COMPLETION DATE	TOTAL DEPTH	PRODUCING FORMATION	TOP, PROD. FORMATION	INITIAL POTENTIAL	FIELD NAME	CLASS
34	Engineered Prod.	Blaylock #1-A	28-14N-8E	Creek	7-9-47	3012	Skinner	2490	5 Bbls.	-	N.Fm.
35	Big Four Pet.	Bland #5	33-19N-7E	Creek	12-2-47	2650	Wilcox	2639	70 "	Cushing	Ext.
36	Martin	Douglas #1	7-15N-10E	Creek	12-9-47	3270	Misener	3265	50 "	-	New
37	Cities-Service	Mariner #2	6-22N-3W	Garfield	8-19-47	5238	Oswego	4620	.28 Mil	Garber	N.Fm.
38	Continental	Parker #1	9-20-4W	Garfield	7-29-47	5521	Penn.	5132	7.25 Mil	Brown	"
39	Davon	Brunken #1	32-23N-4W	Garfield	7-29-47	6082	2nd Wil.	6045	50 Bbls.	S. E. Spring Valley	New
40	Oil Carriers	Martin-Rose #1	1-4N-4W	Garvin	2-11-47	10,320	Hunton	8585	341 Bbls.	E. Lindsay	New
41	Anderson-Prich.	Seaton #1	14-2N-2W	Garvin	4-1-47	6507	Deese	6424	912 "	N. E. Elmore	New
42	Bauman Dlg.	Frankenburg #1	7-4N-3W	Garvin	6-17-47	10,077	McLish	10,000	1,280 Bbls.	E. Lindsay	N.Fm.
43	Biffle	Pharoah	15-3N-2W	Garvin	6-17-47	5627	Deese	5565	210 Bbls.	Antioch	New
44	Bauman Dlg.	Myers #1	7-4N-3W	Garvin	6-3-47	10,188	Bromide	9840	225 "	E. Lindsay	Ext.
45	Sohio	Howard #1	17-1N-2W	Garvin	7-8-47	10,818	"	10,060	661 "	Eola	New
46	Ledgerwood	Hope #1	32-4N-2W	Garvin	7-8-47	7000	Deese	6226	63 "	S. Maysville	"
47	Magnolia	Martin-Rose #1	1-4N-4W	Garvin	7-29-47	10,375	"	7643	72 "	E. Lindsay	N.Fm.
48	Magnolia	Lacy #1	5-4N-3W	Garvin	7-29-47	10,250	Bromide	9608	188 "	"	Ext.
49	Carter	Bradshaw #1	4-4N-3W	Garvin	9-16-47	9371	Deese	7142	266 "	S. E. New Hope	New
50	Sunray	Romine #1	19-1N-2W	Garvin	10-21-47	1780	Arbuckle	1762	92 "	S. W. Eola	"
51	Cities Service	Biffle #1	23-3N-2W	Garvin	10-7-47	5562	Deese	5425	66 "	S. E. Antioch	"
52	Hoffman	McClain #1	25-2N-1W	Garvin	11-12-47	4680	Deese	4615	83 "	E. Brady	"
53	Gulf	Hamilton #1	11-3N-2W	Garvin	11-12-47	6194	Bromide	5764	194 "	N. E. Antioch	"
54	Vierson-Cochran	Hart #1	23-3N-3W	Garvin	1-14-47	7723	Deese	7206	20 "	Panther Creek	"
55	Globe et al	Carr #1	29-3N-2W	Garvin	7-17-47	8250	Bromide	7389	492 "	S. W. Antioch	N.Fm.
56	McCasland et al	Woods "B" #1	17-3N-5W	Grady	2-4-47	3477	Deese	3098	15 Mil	Knox	N.Fm.
57	Ohio	Woods #1	17-3N-5W	Grady	4-8-47	3941	Springer	3492	797 Bbls.	"	"
58	Magnolia	Boatright #1	33-5N-6W	Grady	4-29-47	11,418	Spires	11,340	200 "	Chitwood	Ext.
59	Huber Corp.	Heironymus #1	3-26N-24W	Harper	9-16-47	7007	Penn.	5434	.7 Mil	-	New
60	Texola	E. Meadors #1	31-9N-11E	Hughes	1-14-47	3110	Cromwell	3096	688 Bbls.	S. E. Wetumka	New
61	Mid-Continent	Thompson #1	11-6N-8E	Hughes	2-4-47	2730	Booch	2670	20 "	Spaulding Townsite	"
62	Iron Dlg.	Thompson #1-A	11-6N-8E	Hughes	2-25-47	713	Calvin	698	.5 Mil	"	N.Fm.
63	Deep Rock et al	Wilbanks #1	6-6N-10E	Hughes	2-4-47	3945	Gilcrease	3180	36.6 "	Horns Corner	"
64	Rose et al	Hyde	29-6N-8E	Hughes	3-18-47	853	Calvin	848	20 Bbls.	N. W. Hawkins	"
65	Gillespie	Meadors #1	31-8N-9E	Hughes	3-4-47	2818	Booch	2790	75 "	-	New
66	Manahan	Darks #2	8-9N-10E	Hughes	3-25-47	934	Calvin	887	3.22 Mil	Wetumka	Ext.

NO.	OPERATOR	FARM	LOCATION	COUNTY	COMPLETION DATE	TOTAL DEPTH	PRODUCING FORMATION	TOP, PROD. FORMATION	INITIAL POTENTIAL	FIELD NAME	CLASS
67	Davon	Diamond #2	5-8N-10E	Hughes	5-6-47	3246	Booch	2400	1.864 Mil.	N. Yeager	Ext.
68	Dempsey	Jacobs #1	3-7N-8E	Hughes	6-10-47	3302	Cromwell	3278	(2½ 89 Bbls	-	New
69	McIntyre et al	Harris #1	9-9N-9E	Hughes	6-3-47	3318	"	3301	(1 Mil.:	E. Gilcrease	N.Fm.
70	Pine	Wesky-Hopiye #1	31-9N-11E	Hughes	6-3-47	3265	Booch	2135	1.1 Mil	S. E. Wetumka	"
71	Hall	Burkett #1	34-8N-10E	Hughes	8-26-47	1968	Penn.	1960	1.5 "	Greasy Creek Dist.	"
72	Lario	Fream #1	33-7N-8E	Hughes	9-2-47	3514	Booch	2750	25 Bbls.	E. Fish	New
73	Mid-Continent	McAfee #1	2-9N-11E	Hughes	9-2-47	3420	Gilcrease	2955	8.5 Mil.	E. Alabama	"
74	Mid-Continent	Echols #1	25-9N-10E	Hughes	5-13-47	3264	Booch	2233	5 "	S.E. Wetumka	N.Fm.
75	Mid-Continent	Meadors #1	36-9N-10E	Hughes	7-29-47	3197	"	2260	2.1 "	"	Ext.
76	Hall	Burkett #2	34-8N-10E	Hughes	11-11-47	2600	"	2555	25 Bbls.	Greasy Creek Dist.	New
77	Edwards et al	Carter-Bonner#1	21-3S-4W	Jefferson	9-9-47	2608	Penn.	1625	5.5 Mil	-	New
78	Hunter	Pfile #1	24-7S-6W	Jefferson	4-8-47	2157	Perm.	1437	4 Bbls.	-	"
79	Westgate	Wentz #1	28-28N-1E	Kay	1-28-47	3796	Burgess	3524	14 Bbls.	S. W. Peckham	New
80	Prunty	McCulloch #1	12-26N-2W	Kay	5-27-47	3710	Layton	2910	60 Bbls.	Hubbard	Ext.
81	Goldenstern	Chambers #4	9-25N-2W	Kay	8-12-47	4540	Arbuckle	4532	54 "	Chambers	"
82	Morgan	Lambding #1	28-29N-1E	Kay	6-3-47	3436	Peru	3070	15 "	Vernon	"
83	King	Lankard #1	34-17N-6W	Kingfisher	4-22-47	8330	Hunton	7551	4 Bbls.	-	New
84	Debolt	McCurdy #1	7-6N-17W	Kiowa	2-11-47	957	Hunton	487	Gas	-	New
85	Royal Petrol.	Krieger #1	10-6N-17W	Kiowa	9-2-47	1502	Sd	860	6 Bbls.	-	"
86	Royal Petrol.	Vursels #1	31-7N-17W	Kiowa	10-14-47	1426	Sd	1152	6 "	-	"
87	Gillespie	Manns #1	33-17N-6E	Lincoln	1-1-47	3932	B'ville	3224	10.5 Mil	Ravendale	New
88	King	Bledsoe #1-A	11-13N-6E	Lincoln	6-24-47	2932	Prue	2924	10 Bbls.	Peck Dist.	"
89	Texas	Carter #1	25-17N-2E	Lincoln	7-9-47	4797	Hunton	4505	322 "	S. Perkins	"
90	Vickers, et al	Bradshaw #1	8-14N-5E	Lincoln	8-19-47	3485	Prue	3470	23 "	W. Davenport	Ext.
91	Davon	Dye #1	15-14N-5E	Lincoln	8-5-47	3422	Prue	3370	489 "	S. E. Daggett	New
92	Danciger et al	Shaffner #1	7-13N-6E	Lincoln	1-28-47	4440	Simpson	4399	8 "	W. Laffoon	New
93	Jordan	Porter #1	30-16N-1E	Logan	5-6-47	4890	B'ville	4879	26.6 Mil	S. E. Meridian	New
94	Gulf	Bliss #1	26-17N-1E	Logan	6-10-47	5192	Layton	3634	11 Bbls.	S. Coyle	"
95	Stanolind	Christner #2	30-15N-4W	Logan	7-22-47	6887	B'ville	6520	5 Mil.	W. Edmond	N.Fm.
96	Woods	Crabtree #1	4-16N-1E	Logan	10-7-47	5290	2nd Wil.	5238	713 Bbls.	N. W. Iconium	New
97	Olson et al	Ott #1	4-21N-9W	Major	3-25-47	8124	2nd Wil.	8006	44 Dist. 11.1 Mil.	S. E. Meno	New
98	Superior	Scott #1	27-22N-10W	Major	6-24-47	8312	Manning Sd.	6723	72 Bbls.	Ringwood	Ext.

Discoveries and Extensions in 1947 (Cont'd)

NO.	OPERATOR	FARM	LOCATION	COUNTY	COMPLETION DATE	TOTAL DEPTH	PRODUCING FORMATION	TOP, PROD. FORMATION	INITIAL POTENTIAL	FIELD NAME	CLASS
99	Plymouth	Gibson #1	14-5N-4W	McClain	1-21-47	11,557	Hunton	10,145	110 Bbls.	N. Lindsay	N.Fm.
100	Ryan	Harrison #1	25-5N-4W	McClain	3-18-47	10,711	2nd Brom.	10,430	528 "	N. E. Lindsay	"
101	Oil Carriers	Gulf-Wynn Fee #1	27-5N-4W	McClain	4-1-47	10,212	Hunton	10,115	1,057 "	"	New
102	Russell	Sandburr #1	22-5N-4W	McClain	5-6-47	11,517	Hunton	10,270	125 "	N. Lindsay	N.Fm.
103	Big Chief	Marshall #1	14-5N-2W	McClain	5-27-47	6978	Hunton	6951	20 "	S. W. Wayne	Ext.
104	Sinclair	Garrett #1	13-5N-2W	McClain	7-1-47	7962	Hunton	6730	18 "	"	"
105	Dearing	Howard #1	15-5N-2W	McClain	7-22-47	7200	Penn.	7044	20 "	"	"
106	Superior	Harris #1	26-5N-4W	McClain	8-5-47	10,901	Bromide	10,807	270 "	N. E. Lindsay	"
107	Sinclair	McDaniel #1	35-5N-4W	McClain	10-7-47	11,262	"	10,524	410 "	E. "	"
108	Morgan et al	Hunter #1	30-5N-3W	McClain	12-9-47	10,171	"	9284	301 "	-	New
109	Bauman	Ainsworth #1	26-5N-4W	McClain	1-28-47	10,997	Hunton	9892	662 "	N. E. Lindsay	Ext.
110	Sohio	Purtle #1	23-1N-2E	Murray	8-28-47	1570	Oil Creek	1230	173 Bbls.	N. W. Sulphur	New
111	Harwell	Greer #1	24-23N-1W	Noble	2-11-47	4395	B'vlle	4370	185 Bbls.	S. E. Ceres	Ext.
112	British-Amer.	Will "B" #1	20-22N-1W	Noble	4-29-47	4986	Miss. Ls.	4776	140 "	Fourdee	"
113	Kingwood	Rolay	35-23N-1W	Noble	4-29-47	4489	B'vlle	4487	412 "	S. Ceres	New
114	Grisso Roy.	Seids #1	29-22N-1W	Noble	7-22-47	4877	Miss. Ls.	4740	34 "	Fourdee	Ext.
115	Derby et al	Weigle #1	2-21N-2W	Noble	7-1-47	5139	2nd Wil.	5126	1,560 "	S. E. Polo	New
116	Davon	Tautfest #1	32-24N-1E	Noble	7-29-47	4526	B'vlle	4315	10 "	N. E. Longview	"
117	Warren Oil Corp.	Burgess #1	8-21N-1W	Noble	12-2-47	5178	Wilcox	5166	163 "	N. W. Perry	"
118	Anderson-Prich.	Bocox #1	19-22N-1W	Noble	9-16-47	4845	Miss. Ls.	4756	64 "	Fourdee	Ext.
119	Falcon-Seaboard 1/2 (Teale)	M. Port #1	31-24N-1E	Noble	10-14-47	4540	B'vlle	4335	5 "	N. E. Longview	"
120	Deep Fork	Callahan #1	19-12N-10E	Okfuskee	6-17-47	3220	Cromwell	3188	6.5 Mil	W. Morse	Ext.
121	Ingling	Wade #1	22-10N-11E	Okfuskee	4-4-47	2900	Penn.	735	.786 Mil	S. W. Weleetka	"
122	Crosbie	Schultz #1	30-12N-7E	Okfuskee	3-18-47	3364	Earlsboro	3348	75 Bbls.	Garden Grove	N. Fm.
123	Bay Pet.	Folansbee #1	16-13N-8E	Okfuskee	3-11-47	3576	Dutcher	3567	90 "	-	New
124	Berry	Palmer #1	11-12N-8E	Okfuskee	5-6-47	3761	Cromwell	3751	92 "	S. Valley Grove	"
125	Halko et al	Wells #1	12-11N-6E	Okfuskee	6-17-47	2884	Penn.	2869	60 "	N. E. Kaokuk	"
126	Mid-Continent	Terry #8	30-12N-7E	Okfuskee	6-3-47	2625	Wewoka	2560	175 "	Garden Grove	N.Fm.
127	Fleming	Harjo #3	16-10N-11E	Okfuskee	9-23-47	1645	Penn.	1640	240 "	Weleetka	"
128	Wells et al	Rose #1	29-10N-12E	Okfuskee	9-23-47	1995	Booch	1978	1.0 Mil	-	New
129	Senate Oil	Woodward #1	13-12N-9E	Okfuskee	9-2-47	3259	Gilcrease	3076	40 Bbls.	W. Morse	Ext.
130	Oil & Gas Ind.	Callahan #1	24-12N-9E	Okfuskee	9-30-47	3150	Penn.	3132	60 "	-	"
131	Jergins Oil	Replogle-Slepka #1	34-12N-10E	Okfuskee	9-30-47	3192	Cromwell	3176	30 "	-	N.Fm.

NO.	OPERATOR	FARM	LOCATION	COUNTY	COMPLETION DATE	TOTAL DEPTH	PRODUCING FORMATION	TOP, PROD. FORMATION	INITIAL POTENTIAL	FIELD NAME	CLASS
133	Fleet	Patten #1	26-14N-4W	Oklahoma	2-28-47	6606	Bvlle	6403	67 Bbls.	W. Edmond	Ext.
134	Gulf	Pauline #1	23-14N-2W	Oklahoma	3-4-47	6199	"	5638	1.52 Mil	-	New
135	Harper-Turner	Boles #1	20-14N-2W	Oklahoma	4-22-47	5960	"	5935	1.5 "	S. Coffee Creek	Ext.
136	Harper-Turner	Van Ostrand #1	2-12N-2W	Oklahoma	5-20-47	6440	Hunton	6152	139 Bbls.	Munger	New
137	Skelly	Adam #1	20-13N-2W	Oklahoma	5-20-47	6210	Unc. & Hun	6106	2.9 Mil	Witcher	"
138	Denver	McKee #1	26-14N-4W	Oklahoma	6-17-47	6460	Bvlle	6423	33 Bbls.	W. Edmond	Ext.
139	Big Chief	Davis #1	22-13N-1E	Oklahoma	7-22-47	4675	Cleveland	4655	65 "	Jones	"
140	Peppers	Parks #1	20-13N-2W	Oklahoma	7-1-47	6230	Unc. Sd.	6147	68 Mil.	Witcher	"
141	Okla.Nat.	Lair #1	21-13N-2W	Oklahoma	8-26-47	6171	Hunton	6120	18 Bbls. 54 Mil	"	" New
142	Harper-Tur.et al	Hyden #1	10-14N-3W	Oklahoma	8-12-47	6561	2nd Wil.	6526	185 Bbls.	E. Prairie Belle	New
143	Cit-Serv.	Farley #1	19-11N-2W	Oklahoma	9-30-47	8344	Arbuckle	6092	66 "	Oklahoma City	N. Fm.
144	Gulf	Frazier #1	11-12N-2W	Oklahoma	9-23-47	6748	Bvlle	6089	36 "	Munger	N. Fm.
145	Peppers	Highley #1	19-13N-2W	Oklahoma	10-21-47	6257	Unc.	6180	35 Mil.	Witcher	Ext.
146	Hall-Miller	Geisler #1	26-13N-1E	Oklahoma	9-16-47	4635	Cleveland	4596	93 Bbls.	Jones	"
147	Stanolind	Reinhart #1	30-13N-2W	Oklahoma	9-23-47	6406	Hunton	6363	191 "	Witcher	"
148	Denver	McKee #2	35-14N-4W	Oklahoma	10-21-47	6701	"	6588	30 "	W. Edmond	"
149	Peppers	Hayes-Witcher #1	32-13N-2W	Oklahoma	11-25-47	6332	"	6276	75 "	Witcher	"
150	Harper-Turner	Duncan #1	16-14N-2W	Oklahoma	9-9-47	5810	"	5742	12 "	Coffee Creek	"
151	Gutowsky	Martin #1	20-13N-2W	Oklahoma	1-28-47	6393	Bvlle	6065	51 Mil.	Witcher	New
152	McIntyre et al	Simpson #1	30-15N-12E	Okmulgee	3-4-47	2759	Wilcox	2751	20 Bbls.	-	New
153	Ryan Consol.	Watson #1	20-13N-12E	Okmulgee	9-16-47	2384	Dutcher	2372	4.5 Mil.	-	"
154	Oliphant	- #1	1-25N-4E	Osage	2-18-47	3351	Miss. Ls.	3328	35 Bbls.	S. Kaw	New
155	Dempsey	- #1	15-20N-10E	Osage	12-22-47	2190	Tucker	2173	7.2 Mil 54 Oil	Shell Lake	"
156	Ellis et al	Mitchell #1	3-20N-2E	Payne	3-20-47	4150	Bvlle	4083	2 Bbls.	-	New
157	Wheeler et al	Soric #1	19-19N-4E	Payne	8-5-47	4287	Bvlle	3774	70 "	S. W. Council Creek	"
158	Wheeler	Soric #1-A	19-19N-4E	Payne	9-16-47	3325	Cleveland	3314	65 "	"	N.Fm.
159	Deardorf	Anderson #1	15-17N-3E	Payne	12-22-47	4614	Red Fork	3982	5 "	-	New
160	Fox & Fox	Gibson #1	8-17N-2E	Payne	10-28-47	4917	"	4225	20 "	N. E. Goodnight	"
161	Jackson	Butcher #1	2-18N-4E	Payne	10-14-47	4037	Miss. Ls.	3745	5 "	-	"
162	Cooper	Marshall #1	31-6N-4E	Pontotoc	10-7-47	3246	Wanette	3240	50 Bbls.	S. Asher	New
163	Mullins	Adair #1	14-4N-7E	Pontotoc	11-4-47	2765	Calvin	733	3 "	-	"
164	Belgan Oil	Britt #2	20-4N-7E	Pontotoc	12-9-47	1492	Gilcrease	1482	57 Mil.	-	"
165	Duncan	Bayne #1	17-5N-6E	Pontotoc	12-9-47	2008	Senora	1742	96 Bbls.	-	"

Discoveries and Extensions in 1947 (Cont'd)

NO.	OPERATOR	FARM	LOCATION	COUNTY	COMPLETION DATE	TOTAL DEPTH	PRODUCING FORMATION	TOP, PROD. FORMATION	INITIAL POTENTIAL	FIELD NAME	CLASS
166	Brown et al	Billington #1	26-8N-4E	Pottawatomie	4-11-47	3712	Earlsboro	3703	15 Bbls.	N. St. Louis	N.Fm.
167	Continental etal	Rosebush #1	19-8N-2E	Pottawatomie	5-20-47	6234	Hunton	5390	250 "	W. Burnett	"
168	Brown et al	Villines #1	23-8N-4E	Pottawatomie	6-10-47	4161	Hunton	4044	200 "	N. St. Louis	Ext.
169	Phillips et al	Chapman #1	1-10N-4E	Pottawatomie	8-26-47	4150	Bvlle	4127	78 "	E. Shawnee	New
170	Wood River	Swan #1	29-6N-5E	Pottawatomie	9-2-47	2682	Earlsboro	2669	10 "	-	"
171	Continental	Nejahnquit #6	19-7N-4E	Pottawatomie	9-2-47	3842	Penn.	3611	15 "	St. Louis	N. Fm.
172	Deep Rock	Black #1	17-10N-2E	Pottawatomie	9-2-47	6026	Simpson	6021	175 "	W. Shawnee Lake	New
173	Std. of Kans.	Roberts #1	15-10N-7E	Seminole	1-1-47	3572	Gilcrease	3547	406 Bbls.	E. Haney	New
174	Sam Trant	Canard #1A	35-11N-6E	Seminole	2-4-47	2646	Calvin	2609	3.9 Mil.	Keokuk	N.Fm.
175	Carter Constr.	Renton #1	3-9N-6E	Seminole	3-25-47	3544	Booch Sd.	3520	34 Bbls.	Searight	Ext.
176	Std. of Kans.	Looney #1	15-10N-7E	Seminole	3-4-47	3465	"	3442	95 "	E. Haney	N.Fm.
177	Davon	Mee #1	16-8N-7E	Seminole	4-1-47	4274	Cromwell	3260	132 "	S. E. Lima	New
178	Lindley	Davis-Patterson#1	30-7N-8E	Seminole	6-10-47	1902	Calvin	1544	12 "	Fish	N.Fm.
179	McIntyre et al	Brown #1	14-9N-7E	Seminole	8-26-47	4337	Booch	3230	40 "	W. Bethel	"
180	Gulf et al	Patterson #3	17-10N-7E	Seminole	8-12-47	3734	Cromwell	3718	23 "	Car Creek	"
181	Gulf	Bob #1	22-10N-7E	Seminole	8-12-47	3811	Booch	3470	16 "	E. Haney	Ext.
182	Hall, et al	Viersen #1A	7-6N-7E	Seminole	12-2-47	3110	Calvin	1651	4.6 Mil.	-	New
183	Gem Oil	Rock #1	32-6N-6E	Seminole	6-10-47	3673	Allen	1996	60 Bbls.	N. W. Tyrola	"
184	Beebe, et al	Ong #1	28-8N-7E	Seminole	3-4-47	3200	Booch	3172	35 "	-	Ext.
185	Nye	Wilson #1	2-5N-7E	Seminole	8-26-47	2663	Gilcrease	2633	90 "	Allen Dist.	N.Fm.
186	Amerada	Jacob #1	13-1S-6W	Stephens	2-11-47	4968	Penn.	2962	359 Bbls.	W. Velma	Ext.
187	Coline Oil	Cooper #1	1-2N-8W	Stephens	2-4-47	12,159	"	9015	15 "	-	New
188	Lundy & Shear	Williams #1	7-1S-8W	Stephens	4-1-47	3074	"	2286	10.6 Mil.	-	"
189	Skelly et al	Woodmansee #1	14-2S-4W	Stephens	7-1-47	4202	Dorn.Hills	3982	35 Bbls.	-	"
190	Pace	Watkins "A" #19	21-2S-7W	Stephens	7-29-47	3200	Detr.Simp.	3184	37 Mil.	Comanche	N.Fm.
191	Stanolind	Sims #1	2-1S-4W	Stephens	8-26-47	6770	Springer	4720	118 Bbls.	Scholem-Alechem	"
192	Skelly et al	Horton #1	14-2S-4W	Stephens	8-26-47	3749	Deese	2666	60 "	Milroy	Ext.
193	Gilmer Oil	Creel #1	5-1S-5W	Stephens	9-16-47	6442	Springer	6265	7.8 Mil.	S. E. Cruce	New
194	Mudge Oil	Sembritzky	24-1N-7W	Stephens	9-30-47	7188	Hoxbar	7170	160 Bbls.	N. E. Duncan	"
195	Howell, et al	Gatlin #1	2-1S-6W	Stephens	11-18-47	7507	Deese	5930	40 "	-	"
196	Texas	Denny #1	1-2S-4W	Stephens	5-27-47	7383	Springer	6798	38 "	N. W. Camp	"
197	Sohio	Wesley #1	17-3S-4W	Stephens	9-23-47	2298	Penn.	2114	15 Mil.	Asphaltun	N.Fm.

*Index numbers refer to Figure 1.
/Under "Class": New--New Oil or Gas Discovery
Ext.--Extension to Pool
N. Fm.-New Producing Formation

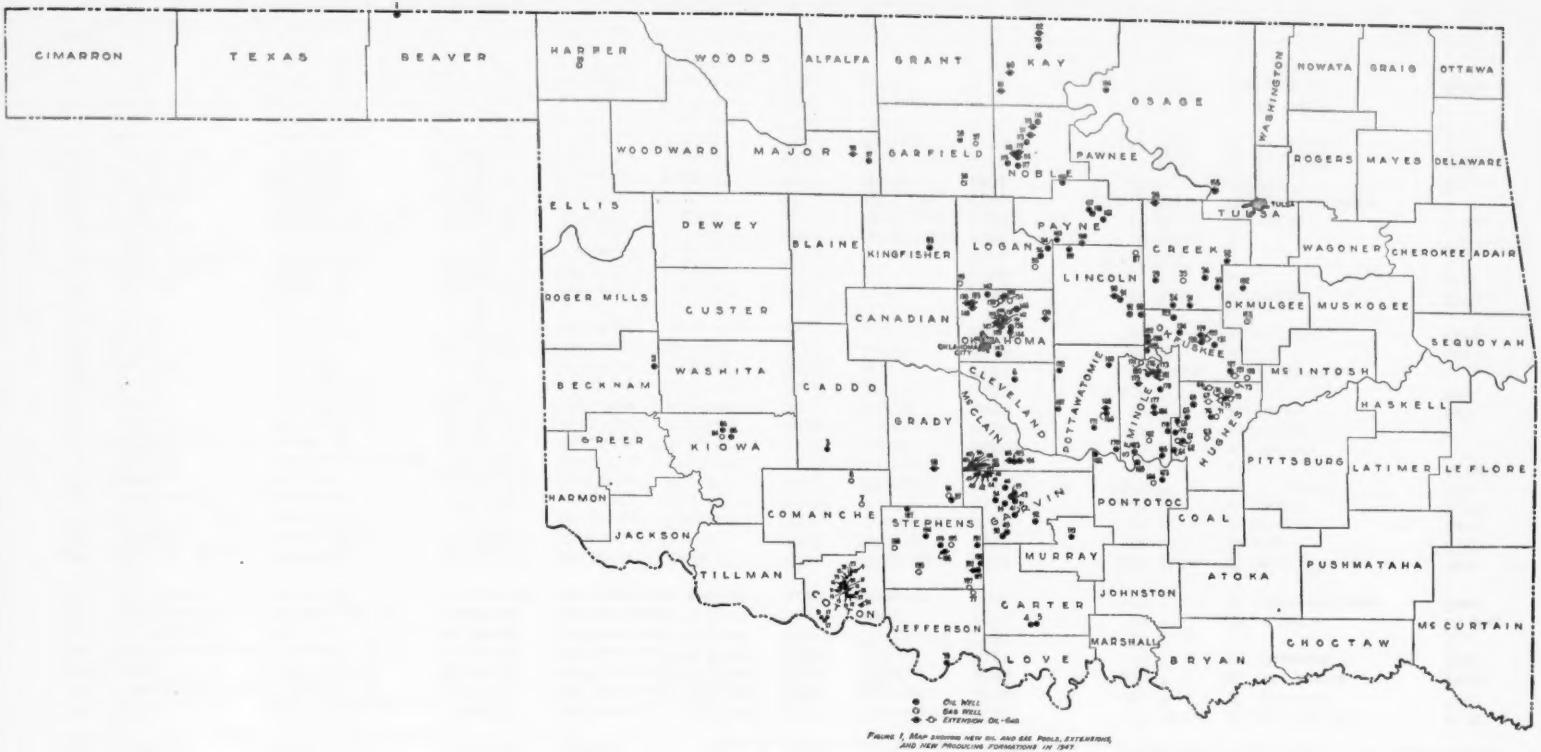

FIGURE 1. MAP SHOWING NEW OIL AND GAS POOLS, EXTENSIONS, AND NEW PRODUCING FORMATIONS IN 1947.

FIG. 1.

younger formations. This search resulted in the discovery of reserves of considerable importance and served to intensify interest in this part of the stratigraphic section, not only in the Ardmore basin, but in adjoining parts of the co-extensive Anadarko basin.

Sholem Alechem field, Stephens County.—Springer production was discovered on the north flank of the Sholem Alechem field by the Stanolind Oil and Gas Company's Sims No. 1, NE. ¼, NE. ¼, SE. ¼ of Sec. 2, T. 1 S., R. 4 W., completed on August 26, 1947. The basis for location was a combination of subsurface and geophysical data. The well was drilled to 6,770 feet, approximately 85 feet in the Caney shale, plugged back to 4,905 feet, the casing perforated in a Springer sandstone zone at 4,720–4,894 feet, and completed in this zone, pumping 118 barrels of 28.9° gravity oil in 24 hours. While the initial potential of this discovery was not spectacular, subsequent wells drilled in the area have indicated sandstones of considerable extent and thickness, with a probable reserve greater than any other field discovered in the Ardmore basin in 1947.

Elk City field, Beckham County.—The Elk City field was discovered by the Shell Oil Company's Walters No. 1, center of the NE. ¼, SW. ¼, of Sec. 14, T. 10 N., R. 21 W., completed on November 18, 1947, flowing 469 barrels of distillate and 5,736,000 cubic feet of gas per day. Production is from perforations between 9,260 and 9,360 feet opposite an "arkosic" Pennsylvanian sandstone zone. This well was drilled to the total depth of 13,133 feet in Pennsylvanian beds and plugged back to 10,171 feet; casing was then perforated in the aforementioned sandstone zone. Situated approximately 10 miles north of the Wichita Mountains, and on the southwest flank of the Anadarko basin, this discovery has served to intensify exploratory activities in the entire southwestern Anadarko basin region. The location for this test was made on the basis of seismic exploration. At the close of the year, the areal extent of the producing formation was unknown, inasmuch as no offsets or other tests had been drilled in the area at that time.

Southeast Meno field, Major County.—The Southeast Meno field was discovered by Olsen *et al.*, Ott No. 1, located in the center of the W. ½, SW. ¼, SE. ¼ of Sec. 4, T. 21 N., R. 9 W., which gauged approximately 11 million cubic feet of gas and 44 barrels of distillate when completed in March, 1947. Production is from the "Second Wilcox" (Simpson) sandstone found from 8,006 to 8,124 feet, the total depth. This test was located on the basis of seismic and core-drill data. Significance of the discovery lies in the extension of the area of proved "Wilcox" sandstone production a considerable distance west of the Nemaha-Oklahoma City uplift into the Anadarko basin, with resulting impetus to exploratory activity in that region and northwestern Oklahoma.

Eola field, Garvin County.—The Eola field was discovered by the Sohio Petroleum Company's Howard No. 1, in the SE. ¼, SE. ¼, NW. ¼ of Sec. 17, T. 1 N., R. 2 W., located on the basis of seismic data. Drilled to the total depth of 10,818 feet in the McLish sandstone and plugged back to 10,238 feet, the test was completed in the Bromide sandstone from 10,060 to 10,202 feet, producing initially a

potential of 661 barrels of oil per day. A potential McLish sandstone reservoir was also indicated by a drill-stem test from 10,550 to 10,818 feet, which flowed 28 barrels per hour. Situated on the north flank of the Arbuckle uplift, the area is one of considerable geologic complexity. Sohio's discovery emphasized the possibilities of peripheral Arbuckle uplift structures, and instigated the sharpest leasing activity of 1947 in contiguous areas.

OTHER SIGNIFICANT TESTS

The Superior Oil Company's Weller No. 51-11, located in Sec. 11, T. 8 N., R. 12 W., Caddo County, was drilled to the total depth of 17,823 feet in the Springer formation, establishing it as the deepest hole drilled in the history of the petroleum industry. The first showing of oil was encountered at approximately 8,350 feet with a number of showings occurring in sandstones from that point to the total depth. Casing was cemented at 16,351 feet and a liner run from this depth to the bottom of the hole. All showings were then tested by plugging back and perforating the casing. Though definite showings of oil were obtained, none was considered of commercial value, and the hole was abandoned, August 13, 1947, after more than 16 months of work.

Of unusual interest was the Cities Service Oil Company's Farley No. 5, SW. ¼, NE. ¼, NW. ¼ of Sec. 19, T. 11 N., R. 2 W., which was a Reagan sandstone (Cambrian) test, located in the Oklahoma City field. Formations encountered were the Arbuckle group at 6,005 feet, the Roubidoux at 6,490, Gasconade at 6,780 feet, Honey Creek at 7,900 feet, Reagan at 8,234 feet, and Granite at 8,265 feet, with the total depth of 8,344 feet. A drill-stem test was made in the upper Reagan sandstone from 8,230 to 8,259, with a recovery of 180 feet of mud and 30 feet of salty mud. The well was plugged back to 6,175 feet and completed, producing initially a potential of 66 barrels in the Arbuckle group from 6,092 to 6,105 feet. Arbuckle production is found elsewhere in the Oklahoma City field, and the real significance of this test is in the added data on the rarely drilled Reagan sandstone, an apparently extensive sandstone occurring below the Arbuckle group.

At the close of the year, the Stanolind Oil and Gas Company was drilling ahead on what promised to be the deepest producing well in the world. At its Briscoe Unit No. 1, located in Sec. 4, T. 4 N., R. 5 W., oil of commercial significance was obtained from a sandstone zone from 13,693 to 14,208 feet, the deepest production yet discovered in Oklahoma. The well flowed 15 barrels of oil per hour for 24 hours on a drill-stem test from 13,678 to 14,283 feet. The top of the Bromide (Simpson) sandstone was encountered at 13,644 feet.

EXPLORATORY METHODS

A marked increase in seismic surveying was noted in 1947, with greatest increases in activity occurring in the Arbuckle and Wichita-Mountain areas, and to a lesser degree in the Nemaha-Oklahoma City uplift and northeast Oklahoma

platform areas. The level of seismic exploration in the Anadarko basin remained about the same. A decided decrease in gravimetric work is probably indicative of the passing of a phase in regional exploration, particularly in the Anadarko basin, where this type of exploration has been followed by more detailed methods. Table III summarizes the geophysical and core-drill work in 1947, in comparison with previous years.

TABLE III

SUMMARY OF EXPLORATORY WORK, 1943–1947

Type	*1947*	*1946*	*1945*	*1944*	*1943*
			Crew Months of Work		
Seismograph	501	436	622½	459½	294½
Gravimeter	37	96	106½	72	66½
Torsion Balance	—	—	5¾	—	—
Magnetometer	1	3	23	—	—
			Number of Holes		
Core drill	134	113	270	211	93

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DEVELOPMENTS IN TEXAS PANHANDLE IN 1947[1]

L. B. FUGITT[2] AND R. C. MORRIS[2]
Amarillo, Texas

ABSTRACT

The Panhandle district includes the 25 northwestern counties in Texas. Ten of these counties produce oil or gas.

There was an increase in drilling in 1947 as compared with 1946. In 1947 429 wells were completed. Of these 240 were oil wells, 178 were gas wells, and 22 were dry and abandoned.

No new fields or producing formations were discovered. However, the Phillips Petroleum Company's Elton No. 1 in west-central Hansford County was temporarily abandoned after swabbing 22 barrels of oil and 215 barrels of water in 24 hours from 6,138–6,165 feet, a Pennsylvanian granite wash zone.

In 1947 the Panhandle field produced 29.8 million barrels of oil, approximately equalling the 1946 oil production. Gas production was 834.76 billion cubic feet.

Two exploratory wells, the Phillips Petroleum Company's Virginia No. 1 in Hansford County and the Union Producing Company's Glenn No. 1 in Collingsworth County were drilled to the granite.

The areas of intense leasing were Castro County in the southwest part of the district, and Wheeler, Hemphill, Roberts, and Lipscomb counties in the northeast part of the district. Geophysical operations were concentrated in these areas. There was an increase in seismic and core-drill exploration methods over previous years.

INTRODUCTION

The Texas Panhandle district which includes the 25 northwest counties in Texas is bounded on the north and east by Oklahoma and on the west by New Mexico. The south boundary of the area is formed by the south lines of Parmer, Castro, Swisher, Briscoe, and Hall counties.

DEVELOPMENT

TABLE I

COMPARISON OF DRILLING ACTIVITY IN 1947, 1946, AND 1945

	Oil Wells	*Gas Wells*	*Expl. Wells*	*Ext.*	*Dry*	*Total*
1947	240	178	10	0	22	429
1946	149	123	14	2	45	317
1945	183	341	19	0	43	567

Drilling operations in the proved areas increased in 1947 due to the boost in oil price and the increasing value of natural gas.

In 1947, 29.8 million barrels of oil were produced from the Panhandle field, which is 30.5 thousand barrels less than 1946 production. Gas production in 1947 was 834.76 billion cubic feet.

No new fields were discovered in the Panhandle in 1947.

IMPORTANT EXPLORATORY WELLS

The most important exploratory wells completed during the year were drilled by the Phillips Petroleum Company in connection with gas development in

[1] Manuscript received, April 3, 1948. Presented by title before the Association at Denver, April 26–29, 1948. Published by permission of Stanolind Oil and Gas Company.

[2] Stanolind Oil and Gas Company. Ray W. Miller, Phillips Petroleum Company, furnished production data.

Hansford and Sherman counties. The Hiram No. 1 in north-central Hansford County, which penetrated Mississippian strata of the Meramec series, drilled a section very similar to wells in the more-explored area on the north which encountered relatively thick middle and upper Pennsylvanian limestones. In west-central Hansford and southeast Sherman counties, the Phillips' Elton No. 1 and Cluck No. 1 drilled lower Pennsylvanian and Mississippian strata comparable with the Hiram No. 1 but contained divergent middle and upper Pennsylvanian strata, namely, dark shales and sands.

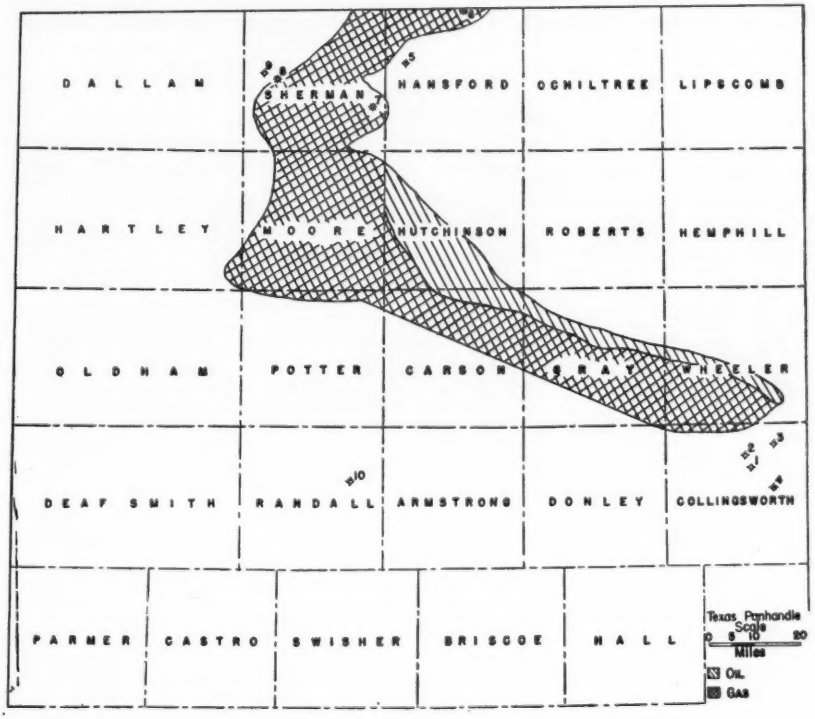


FIG. 1.—Texas Panhandle.

The Phillips' Elton No. 1 in west-central Hansford County was temporarily abandoned after swabbing 22 barrels of oil and 215 barrels of water per 24 hours from 6,138–6,165 feet, a Pennsylvanian granite wash-arkosic limestone zone.

EXPLORATION AND LEASING

There was a decrease in magnetic and gravity types of geophysical exploration in 1947 since most of the major companies have completed general surveys of

these types within the district. At the close of the year, there were 8 seismograph parties, 3 stratigraphic rigs, 2 shallow core drills, 1 gravity party, and 1 magnetometer party operating in the district.

Hansford, Ochiltree, Lipscomb, Roberts, and Hemphill counties in the northeast and Castro and Swisher counties in the southwest part of the district were the areas of most intense geophysical prospecting during the year.

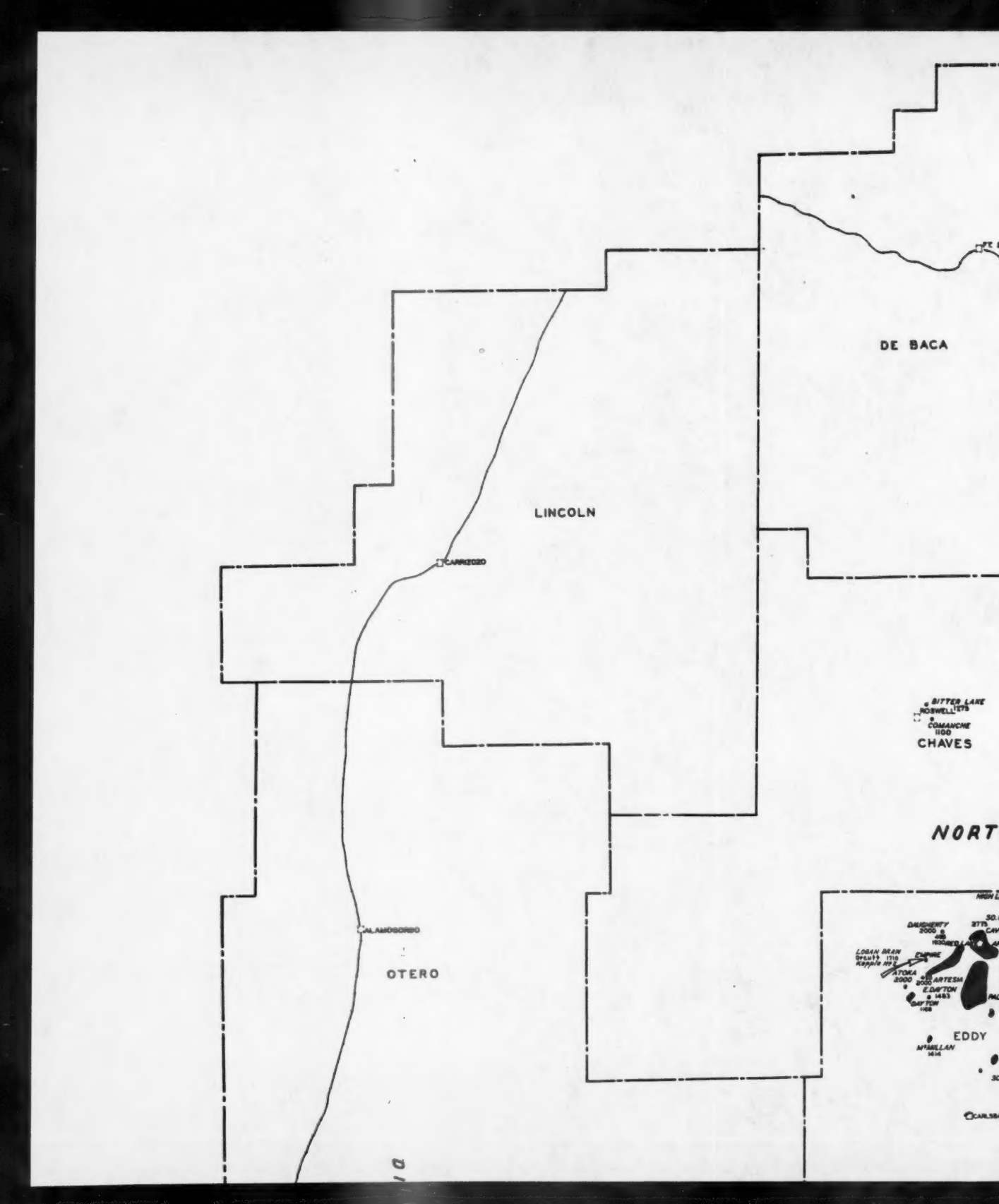
The aforementioned areas were also the most active areas of leasing. A successful wildcat in Beckham County, Oklahoma, east of Wheeler County, Texas, stimulated leasing along the south flank of the Anadarko basin, especially in Roberts, Hemphill, and northern Lipscomb counties toward the close of the year.

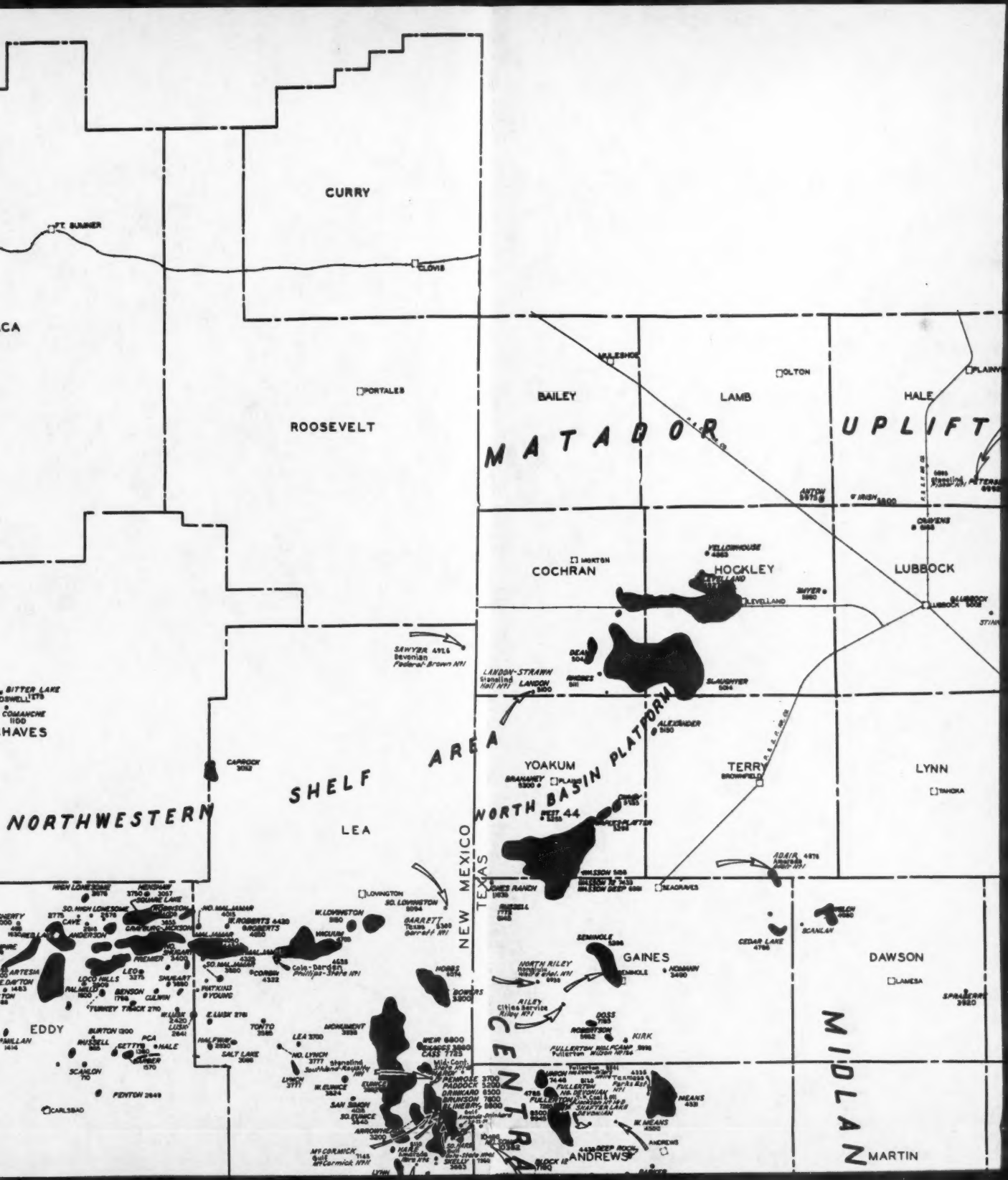
TABLE II

IMPORTANT EXPLORATORY WELLS

	County	*Operator*	*Farm*	*Location Sec.-Blk.-Sur.*	*Basis for Location*	*Results*	*Total Depth (Feet)*	*Deepest Formation*	*Remarks*
1.	Collingsworth	L. M. Hughes	Coleman 1	23-16-HGN	Core drill and subsurface	DA	2,522	Permian	
2.	Collingsworth	S. D. Johnson	Wischkaemper 1	57-16-HGN	Subsurface	DA	2,310	Permian	
3.	Collingsworth	Sinclair-Prairie	Wattenbarger 1	74-12-HGN	Subsurface	DA	2,118	Permian	
4.	Collingsworth	Union Produc.	Glenn 1	87-11-HGN	Core drill, subsurface, and gravity	DA	4,180	Pre-Camb.	
5.	Hansford	Phillips Petr.	Elton 1	155-2-GHH	Subsurface	TA	8,450	Miss.	Swb 22 BO, 215 BW in 24 hrs. from 6,138–6,165
6.	Hansford	Phillips Petr.	Hiram 1	13-1-PSL	Subsurface	13,000 MCF	7,788	Miss.	PB: 2,883
7.	Sherman	Phillips Petr.	Cluck 1	5-3B-GHH	Subsurface	9,800 MCF	6,306	Miss.	PB: 3,180
8.	Sherman	Phillips Petr.	Virginia 1	234-1T-T&NO	Subsurface	15,800 MCF	7,051	Pre-Camb.	PB: 2,870
9.	Sherman	Shamrock O&G	Booth 1	214-1T-T&NO	Subsurface and magnetometer	DA	3,428	Permian	
10.	Randall	Big Bear Oil	Currie 1	57-6-I&GN	Subsurface	DA	6,149	Penn.	

Remarks
22 BO,
5 BW in
hrs. from
138–6,165
2,883
3,180
2,870


DE BACA
LINCOLN
CARRIZOZO
ROSWELL 1175
COMANCHE 1100
CHAVES
NORT
ALAMOGORDO
OTERO
DAUGHERTY 2000
LOCAN DRAW 1715
ATOKA 2000
ARTESIA 3000
EDDY
McMILLAN 1614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DOLLARHIDE ELLENBURGER
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LANGLIE
COOPER
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STONE COLBY
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GOLDSMITH-DEVONIAN
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SAND HILLS, WEST
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OZONA
OTERO
ALAMOGORDO
DIABLO
PLATEAU
EL PASO
HUDSPETH
CULBERSON
SIERRA BLANCA
VAN HORN
RIO GRANDE
DAVIS
GARZA
KENT
EASTERN
HOWARD
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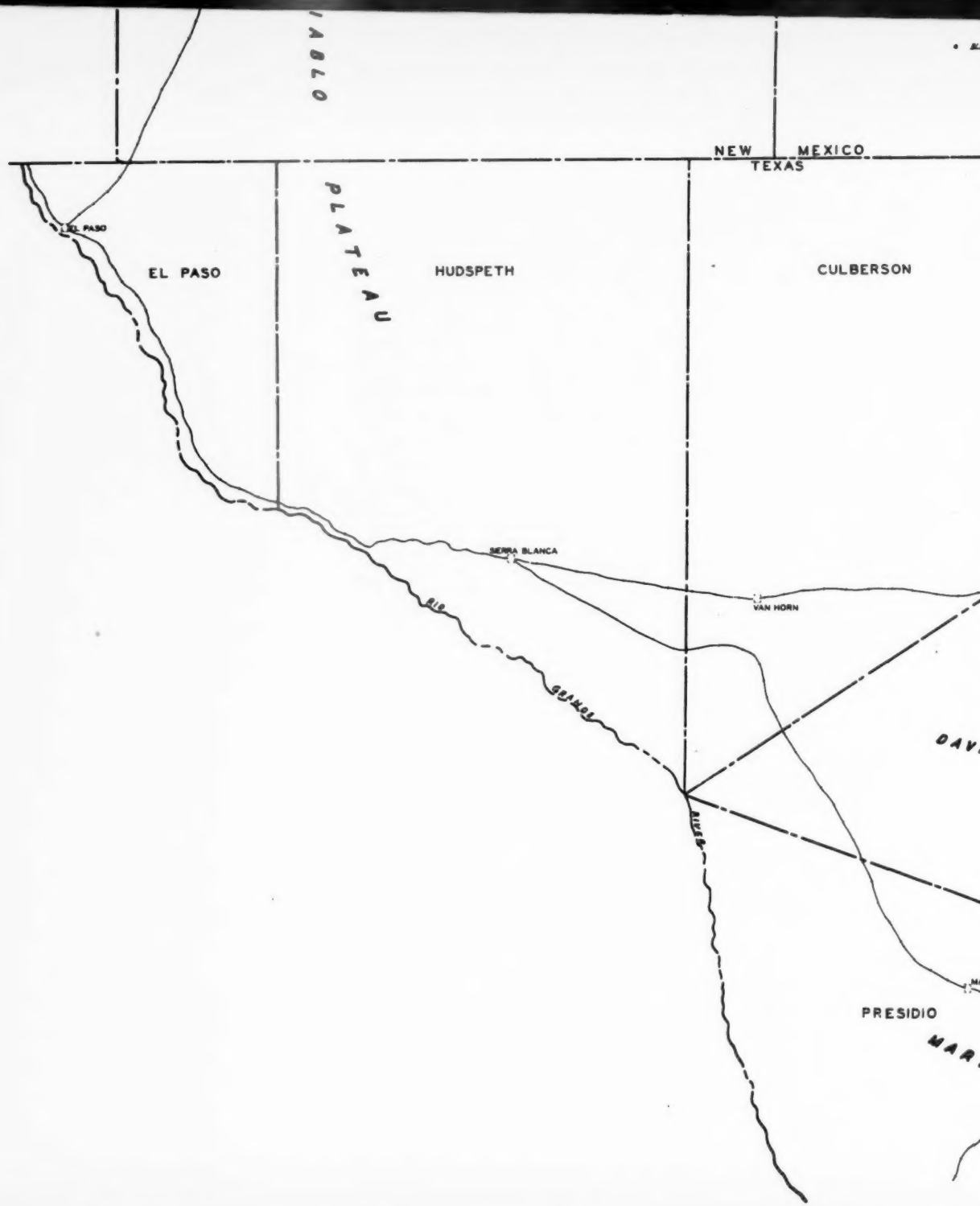
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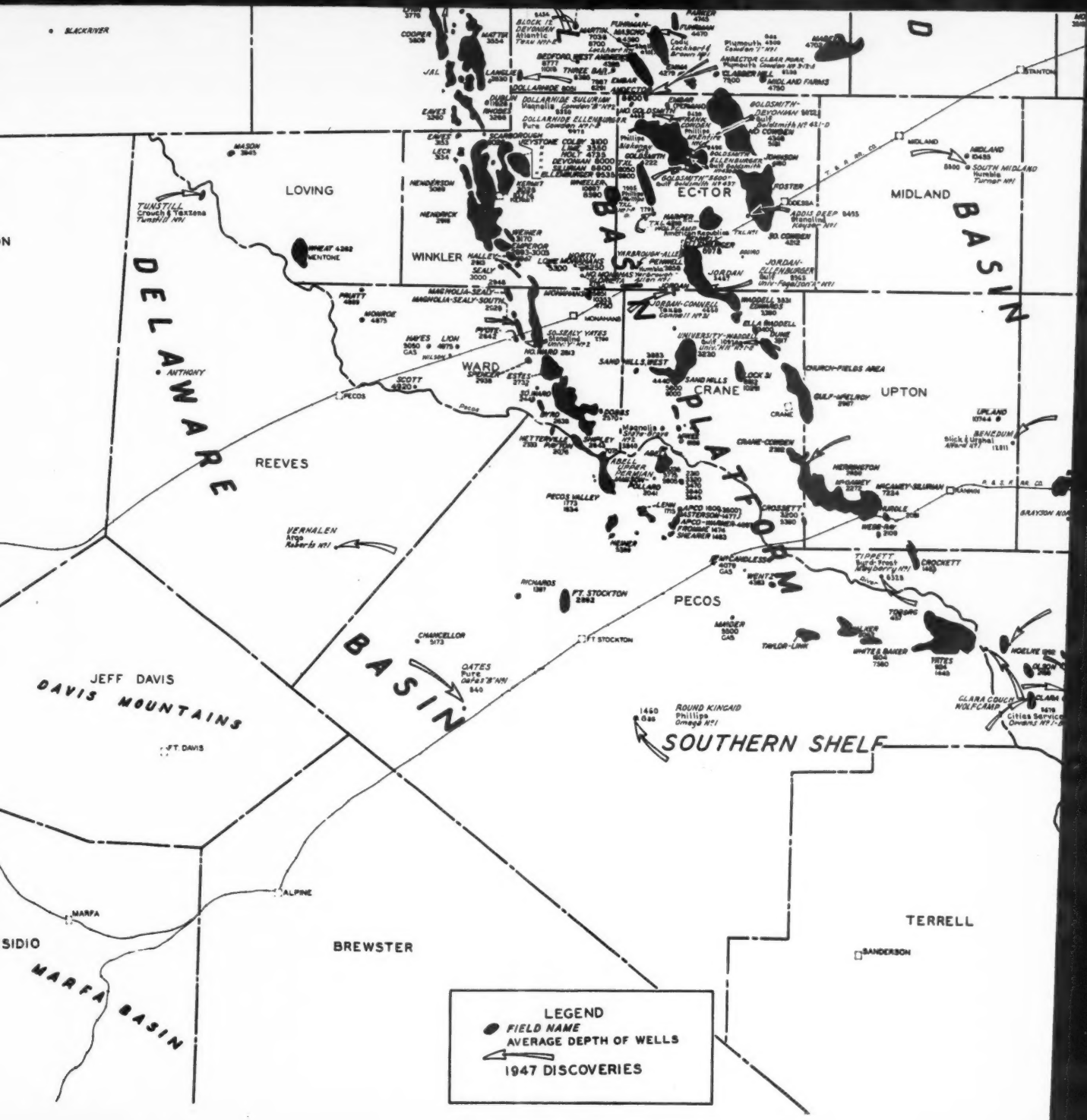
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WEINER
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HALLEY
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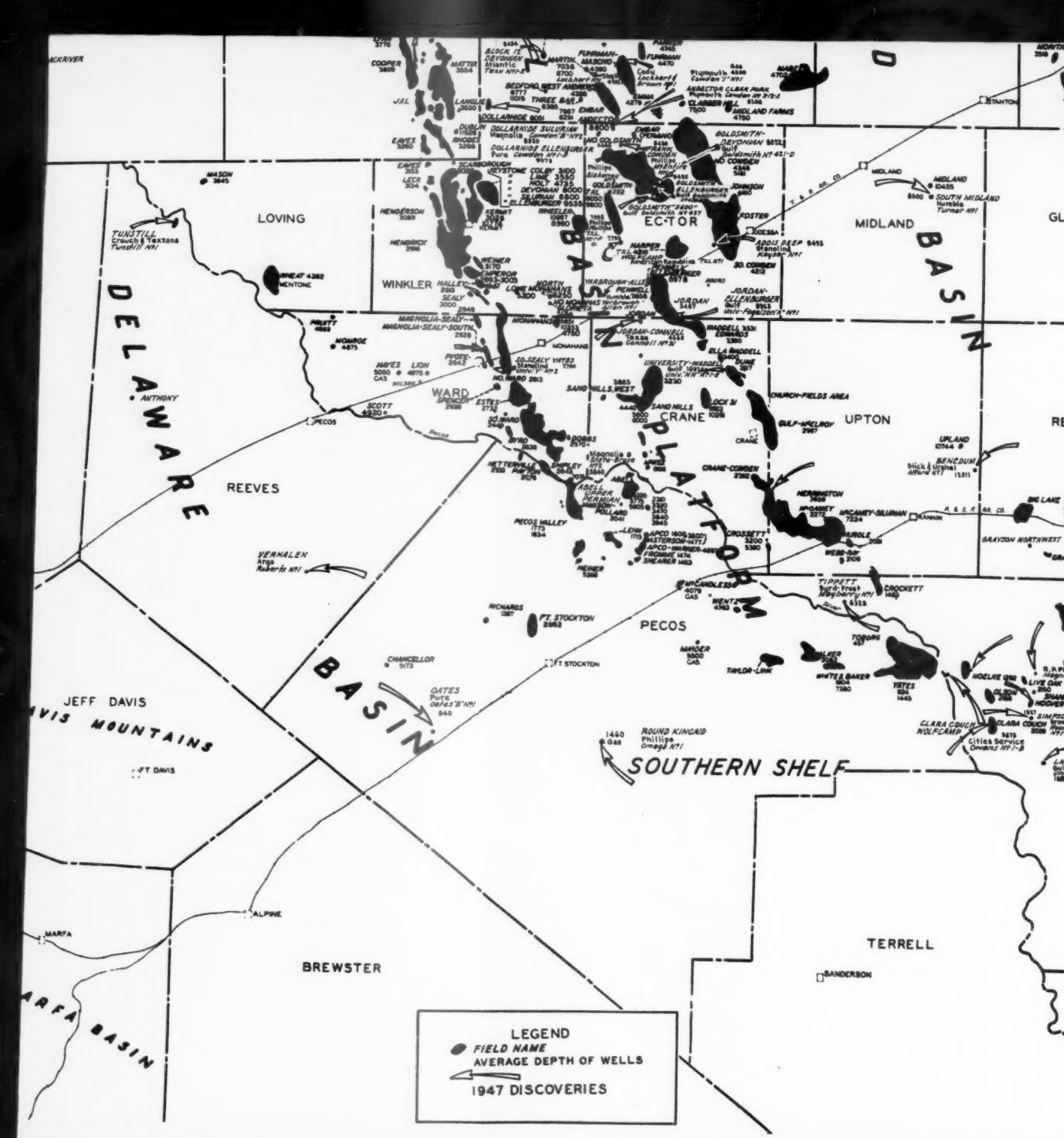
AVERAGE DEPTH OF WELLS
1947 DISCOVERIES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HOLT-CANYON REEF
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PENNZOIL
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MOORE
MONAHANS
MONUMENT
WEST MONUMENT
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SAND HILLS WEST
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SEALY-SMITH-SOUTH
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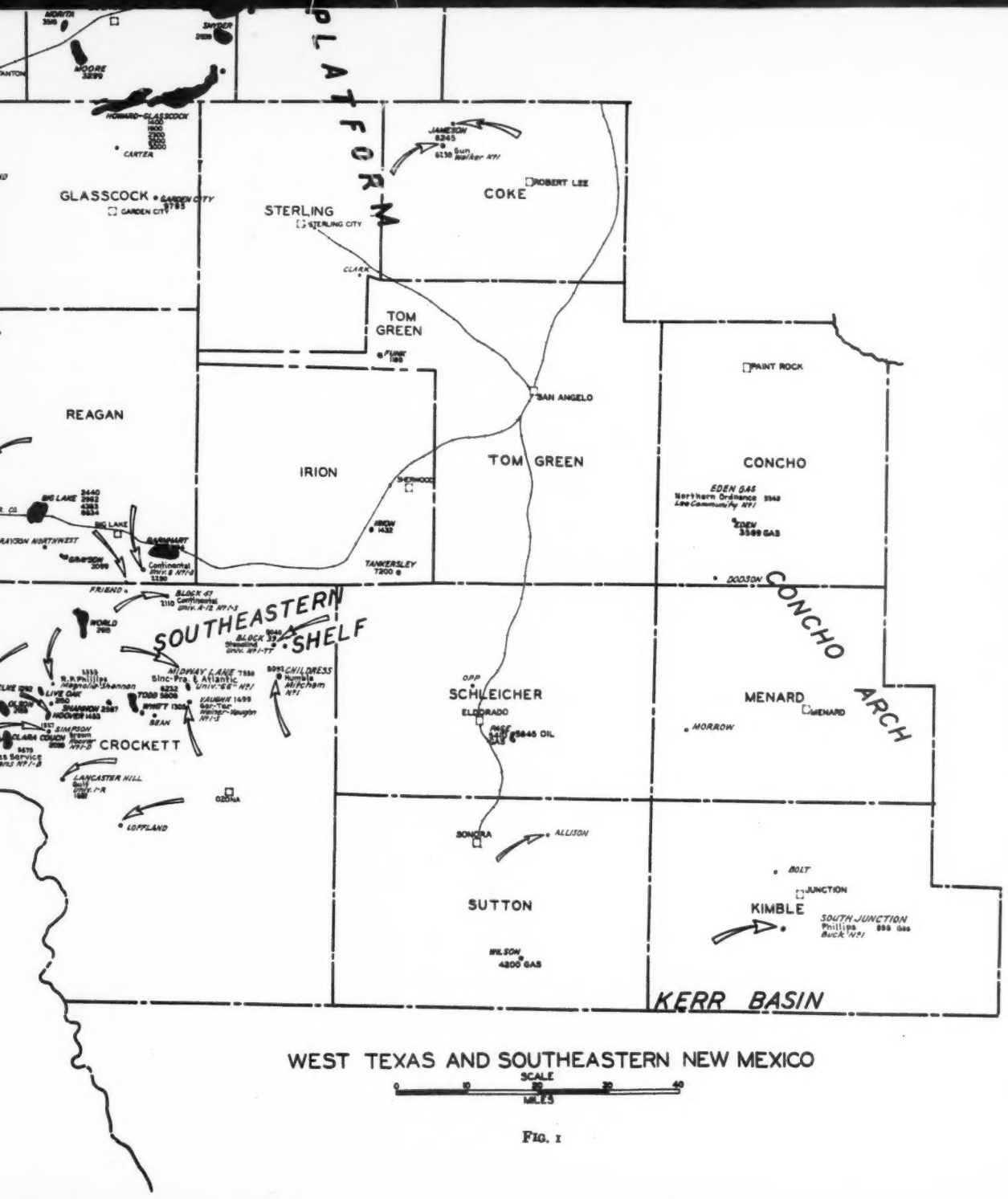

WEST TEXAS AND SOUTHEASTERN NEW MEXICO

FIG. 1

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 963-983, 2 FIGS., 10 TABLES

DEVELOPMENTS IN WEST TEXAS AND SOUTHEASTERN NEW MEXICO IN 1947[1]

C. D. CANTRELL, JR.,[2] LLOYD C. MILLS,[3] AND CLYDE W. TURNER[4]
Midland, Texas

ABSTRACT

During 1947, 2854 wells were drilled in the West Texas-Southeastern New Mexico area, an increase of 28.6 per cent over 1946. Exploratory wells totaled 384, of which 117 were oil wells and 6 were gas wells, a success of 32.0 per cent. Thirty-six new fields and 25 new pools were discovered.

The deepest discovery was Slick and Urschel's Alford No. 1, completed at the total depth of 12,022 feet in the Ellenburger dolomite (Ordovician), as the deepest oil producer in the district, and a discovery of major importance in the south part of the Midland basin. A wildcat of exceptional geologic significance was Argo's Roberts No. 1, in the Delaware basin, which drilled about 12,000 feet of Permian, ending in Strawn (Pennsylvanian) at 14,073 feet, and completed as a small producer from the Wolfcamp (lower Permian?).

Twelve other important pool discoveries were made. Six new Ellenburger dolomite pools were found: University Waddell Ellenburger, Crane County; Jordan Ellenburger, Goldsmith Ellenburger, Yarborough-Allen, and a 2-mile Andector Ellenburger extension or new field, Ector County; Midway Lane Ellenburger, Crockett County; and Dollarhide Ellenburger, Andrews County. An exceptional thickness of Simpson producing sand was opened in the Hare pool, Lea County, and adjacent to it Silurian cherty limestone was found productive in the McCormick pool. Productive Silurian beds were opened in the Dollarhide Silurian pool, Andrews County. Productive Devonian limestone of major significance was discovered in the Shafter Lake Devonian pool, Andrews County. Scattered wells in northwestern Ector County indicate a large Clear Fork (Permian) producing area.

These discoveries were made largely by deeper drilling on known Permian structures, and by seismograph and subsurface geology. Intensive geophysical activity continues, seismograph predominating. Several surface parties are mapping outlying areas of the district. Core drilling for structure continues in many areas.

INTRODUCTION

During 1947, 384 exploratory wells were drilled within the area of this report. Oil producers totaled 117, and 6 were gas wells, a success of 32.0 per cent for all exploratory drilling, as classified by Lahee's methods,[5] and including the "new-field wildcats," "new-pool wildcats," "deeper-pool tests," "shallower-pool tests," and "outposts." Thirty new fields and 23 new pools were found in Texas, and 6 new fields and 2 new pools were discovered in Southeastern New Mexico, making a total of 36 new fields and 25 new pools in the district. A "new field" is a new producing area, and a "new pool," a new reservoir within a producing field.

New discovery wells, not including "outposts," are indicated on the accompanying field maps by arrows. The first map gives all fields and all new discovery arrows, and the second map shows only those fields which produce from rocks of pre-Permian age, and contains only pre-Permian discovery well arrows. Refer

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, March 13, 1948. The writers are particularly indebted to Addison Young and E. Russell Lloyd for suggestions and criticisms. Many other geologists in Midland have given advice generously.

[2] Phillips Petroleum Company.

[3] Southland Royalty Company.

[4] Republic Natural Gas Company.

[5] Frederic H. Lahee, "Exploratory Drilling in 1946," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 31 (June, 1947), pp. 917–30.

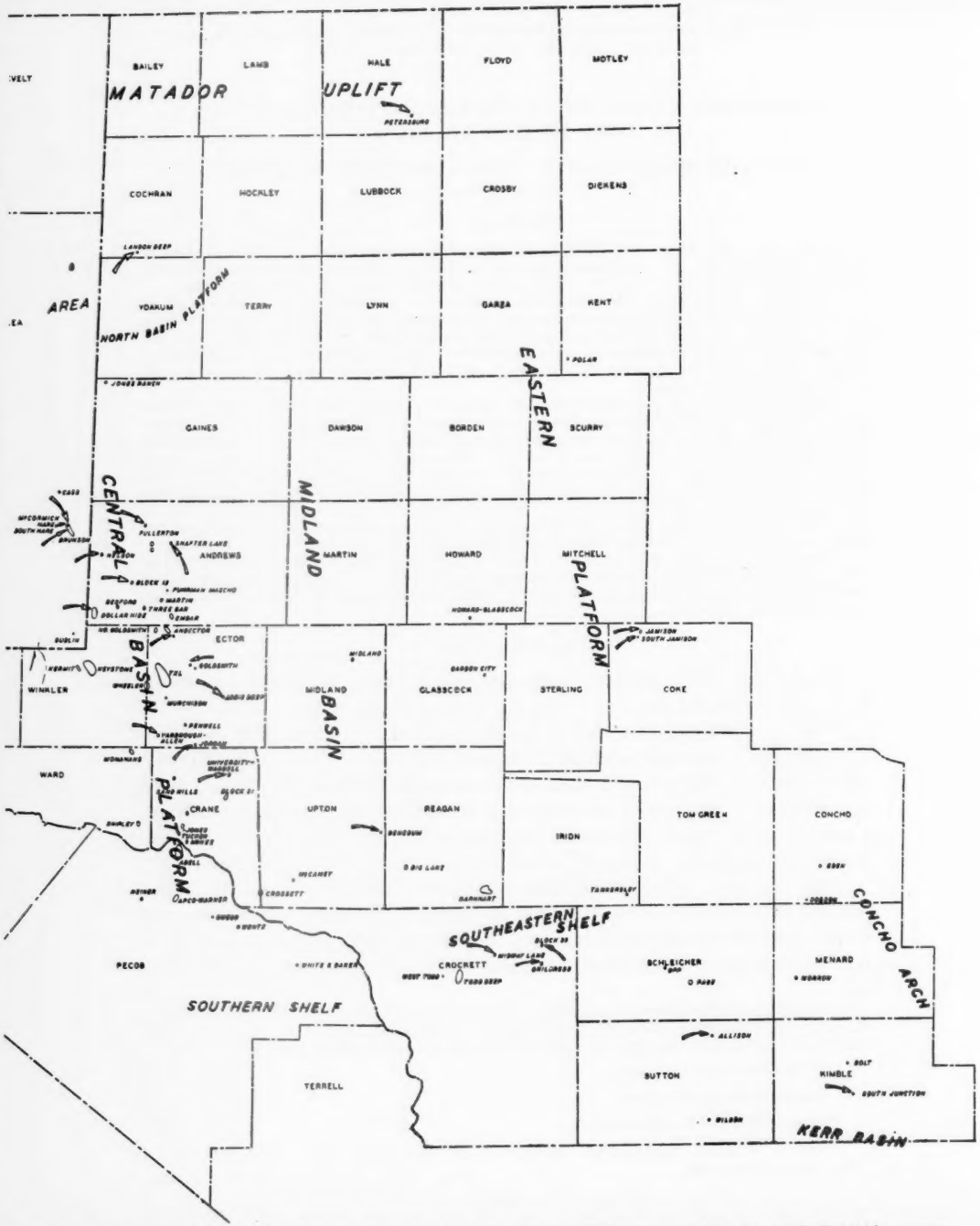

FIG. 2.—Pre-Permian fields of West Texas and Southeastern New Mexico. Fields discovered in 1947 are indicated by arrows.

TABLE I

GEOPHYSICAL ACTIVITY DURING 1947
WEST TEXAS AND SOUTHEASTERN NEW MEXICO

Type	*Average Number of Crews*		*District Total*
	West Texas	*Southeast New Mexico*	
Seismograph	33	9	42
Magnetometer	1	4	5
Gravimeter	7	5	12
Totals	41	18	59

TABLE II

ELEVEN YEARS OF DEVELOPMENT AND PRODUCTION HISTORY
WEST TEXAS AND SOUTHEASTERN NEW MEXICO
(Assembled from preceding A.A.P.G. development papers)

Year	*Total Wells Drilled*	*Field Producers*	*Exploratory Wells*	*Percentage Successes*	*Oil Produced (Million Barrels)*
		ENTIRE DISTRICT			
1937	3,270	2,969	209	21.0	113.47
1938	2,577	2,197	258	27.5	109.63
1939	2,498	2,203	176	32.4	118.88
1940	2,502	2,215	141	54.5	151.38
1941	2,696	2,522	174	17.8	156.91
1942	1,659	1,353	169	23.1	112.96
1943	1,162	925	148	15.5	136.12
1944	2,077	1,658	263	20.9	199.81
1945	2,137	1,565	345	19.1	212.41
1946	2,219	1,766	402	34.3	227.62
1947	2,854	2,386	384	32.0	259.61
		WEST TEXAS			
1937	2,604	2,352	166	22.9	75.52
1938	2,018	1,716	192	24.0	74.37
1939	1,854	1,640	114	25.4	81.91
1940	1,866	1,747	119	39.4	112.90
1941	2,325	2,190	135	20.0	117.57
1942	1,320*	1,107	134	24.6	81.03
1943	902	742	111	15.3	98.07
1944	1,672	1,395	203	20.7	160.78
1945	1,744	1,323	278	16.7	175.54
1946	1,843	1,403	335	36.7	191.28
1947	2,290	1,924	334	33.2	219.96
		SOUTHEASTERN NEW MEXICO			
1937	666	617	43	13.9	37.95
1938	559	481	66	37.9	35.26
1939	648	563	62	45.1	36.97
1940	542	468	22	13.5	38.48
1941	371	332	39	10.0	39.34
1942	339	246	35	17.1	31.93
1943	260	183	37	16.2	38.05
1944	405	263	60	21.6	39.03
1945	393	242	67	28.4	36.87
1946	376	363	67	22.4	36.34
1947	564	462	50	24.0	39.65

* Includes wells drilled deeper and recompleted.

to the accompanying tables for a list of all successful exploratory wells, and significant dry holes.

These discoveries were made largely by deeper drilling on known Permian structures and by seismograph and subsurface geology. Geophysical activity for the year is given in Table I, which shows that seismic work predominates.

TABLE III

FIELDS MOST ACTIVELY DEVELOPED IN 1947
WEST TEXAS AND SOUTHEASTERN NEW MEXICO*

Field	*Oil*	*Gas*	*Dry*	*Total*	*Average Depth (Feet)*
Levelland	140	0	0	140	4,832
Toborg	120	0	15	135	403
Slaughter	127	0	1	128	4,743
Sharon Ridge	124	0	4	128	1,772
Drinkard	126	0	1	127	7,270
Keystone	124	0	1	125	7,110
TXL	101	0	4	105	9,185
Fullerton	87	0	1	88	7,209
Garza	64	0	4	68	3,061

* *Oil and Gas Journal* (January 29, 1948), p. 259.

Development and exploratory wells totaled 2854, an increase of 28.6 per cent over 1946. The increase was in development drilling; exploratory drilling showed a slight decrease.

Eleven years of development and production history are summarized from the 10 past annual development papers in the A.A.P.G. *Bulletin* for the years 1937 through 1946, for the West Texas and Southeastern New Mexico parts of the district separately, and for the entire district in the accompanying tables.

The maps also show the counties covered by this report. The Texas part of the district is that of the Texas Railroad Commission districts 7-C and 8, omitting Cottle, King, Runnels and McCullough counties. The New Mexico part includes 8 southeastern counties.

TABLE IV

FIELDS WHICH HAVE PRODUCED MORE THAN 100,000,000 BARRELS OF OIL TO JANUARY 1, 1948
WEST TEXAS AND SOUTHEASTERN NEW MEXICO*

Field	*Cumulative Production (Barrels)*	*Geologic Age of Producing Formation*
Yates	331,825,000	Permian
Hendricks	212,283,000	Permian
McElroy	175,058,000	Permian
Wasson	149,473,000	Permian
Howard-Glasscock	128,938,000	Permian
Hobbs	119,755,000	Permian
Slaughter	112,358,000	Permian
Big Lake	107,804,000	Permian and Ordovician

* *Oil and Gas Journal* (January 29, 1948), p. 169.

The fields in which the most development wells were drilled are shown in Table III.

Eight fields have produced more than 100 million barrels of oil each, by the end of 1947. They are given in descending order in Table IV.

Oil production is 1947 exceeded that of 1946 by 14 per cent, or 32 million barrels for the entire district. The West Texas part was up 15 per cent, and the Southeastern New Mexico part 9.1 per cent over 1946. Total production from the district was 219,960,000 barrels of oil, the greatest production for any year in the history of the area.

NEW DISCOVERIES, FIELD DEVELOPMENTS, AND IMPORTANT DRY HOLES BY GEOLOGIC PROVINCES

The district has been divided into its principal geologic provinces.[6] The significant developments are discussed by these provinces to give the reader the closest integration of this year's new information. Accompanying maps of the district have these provinces indicated in a generalized way. Definite boundaries are not drawn, because they changed somewhat with geologic time.

Relative number of new-field and new-pool discoveries in the several geologic provinces may be noted in Table V, arranged in descending order. Discussion is in geographic order. Provinces with little important activity in 1947 are omitted.

TABLE V

Province	*Number 1947 New Fields and Pools*
Central Basin Platform	31
Southeastern Shelf	13
Eastern Platform	4
Midland Basin	3
Northwestern Shelf	3
North Basin Platform	2
Delaware Basin	2
Matador Uplift	1
Southern Shelf	1
Kerr Basin	1
Total	61

CENTRAL BASIN PLATFORM

Andrews County, Texas.—One of the more important discoveries in Andrews County and one that has initiated an active drilling program for that area, was the

[6] Robert E. King, Robert L. Bates, John M. Hills, B. G. Martin, Surce J. Taylor, "Resume of Geology of South Permian Basin, Texas and New Mexico," *Bull. Geol. Soc. America*, Vol. 53 (April 1, 1942), pp. 539–60.

Philip B. King, "Permian of West Texas and Southeastern New Mexico," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 26, No. 6 (April, 1942), pp. 535–763.

Sinclair-Prairie Oil Company's Skelly-University No. 1–173. The well was completed in Devonian limestone beds from 9,688 to 9,828 feet, producing 1,036 barrels of oil per day. This discovery was drilled on the basis of seismic information and has been designated as the Shafter Lake Devonian field.

The Atlantic Refining Company's University-Texas No. 1–E was completed as the first Devonian discovery at a depth of 8,570 feet in the Block 12 field. It had an initial daily potential of 30 barrels of oil and 210 barrels of water, pumping, and does not appear to be of major importance.

In the southwest corner of Andrews County, the Magnolia Petroleum Company's E. P. Cowden No. 2–B, was completed as the Silurian discovery in the Dollarhide field. Initial potential was 535 barrels of oil per day, flowing, from 8,345 to 8,365 feet. A second deep producing zone opened in this field in 1947 was found in the Pure Oil Company and Humble Oil and Refining Company's E. P. Cowden No. 1–E, between 9,990 and 10,140 feet in the Ellenburger, whose initial daily potential was 637 barrels of oil. These two new producing zones have stimulated the drilling activity in this field.

The south end of the Fullerton field was developed particularly in the area of the Superior Oil Company's Eva Coopwood No. 1, which was the discovery for this area. The Stanolind Oil and Gas Company was the most active operator and most wells were completed in the Fullerton zone (lower Clear Fork or Tubb, Permian); a few were in the Devonian.

Lea County, New Mexico.—Three important new pools were found in truncated pre-Permian rocks, on the west edge of the Brunson pool (Ellenburger, Ordovician) and underlying the Permian production of the Eunice field. In each case the well was drilled as an outpost of the Brunson pool for Ellenburger dolomite production, but instead discovered new oil pools in truncated, west-dipping younger rocks. The McCormick pool was discovered by the Gulf's McCormick No. 11, Sec. 32, T. 21 S., R. 37 E. Its total depth was 8,318 feet, in Ellenburger dolomite, but it was completed in Silurian cherty limestone through perforations from 7,145 to 7,160 feet. Its initial potential was 487 barrels of 43.6° oil per day, on a $\frac{3}{4}$-inch choke.

The Hare pool was discovered by the Amerada's Hare No. 6, Sec. 33, T. 21 S., R. 37 E., $\frac{1}{2}$ mile southeastward from the Gulf's McCormick No. 11. It was drilled to the total depth of 8165 feet in Ellenburger dolomite, and completed as a producer from the McKee sandstone through perforations from 7,780 to 7,830 feet. Its initial potential was 334 barrels of 41° oil per day on $\frac{1}{2}$-inch tubing choke, after acid treatment.

The South Hare pool, discovered by the Gulf's Cole-State No. 4–A, Sec. 16, T. 22 S., R. 37 E., is a second McKee sandstone producer, $2\frac{1}{2}$ miles south of the Hare pool. Its total depth was 7,651 feet, in granite, and it found no Ellenburger dolomite. Casing was perforated from 7,420 to 7,450 and from 7,360 to 7,390 feet, giving an initial potential of 558 barrels of 40° oil in 16 hours through $\frac{3}{4}$-inch tubing choke.

Active drilling continued in the Drinkard field, in which 126 producers and one dry hole were drilled, making it the fifth field in the district for number of completions. The principal producing zone is the Drinkard dolomite of Clear Fork (Yeso, Permian) age.

The Bowers sand pool (Seven Rivers, Permian), overlying the Hobbs pool, had 27 oil well completions and one dry hole at an average depth of 3,320 feet.

Ector County, Texas.—The Humble Oil and Refining company opened a major Ellenburger producing area in the southwest corner of the county in its Yarbrough and Allen No. 1. The test topped the Ellenburger at 10,495 feet and had not reached the water table at the total depth of 10,620 feet. From open hole below 10,596 feet the well was completed for a daily potential of 867 barrels. The field was located on reflection-seismograph work.

Devonian and Ellenburger oil were produced by the Gulf on the South dome of the Goldsmith field. The Gulf's No. 421–D was dry in the Ellenburger dolomite and was plugged back to 8,022 feet to complete for 131 barrels of oil and 161 barrels of water per day from Devonian cherty limestone. After producing 3,831 barrels the well went to water and was abandoned. The Gulf's Goldsmith No. 430–E was completed as the Ellenburger discovery well of the field. That formation was topped at 9495, and, after logging approximately 125 feet of producing beds above the water table, was plugged back to complete for a daily flowing potential of 301 barrels per day.

The Gulf Oil Corporation opened the Jordan Ellenburger field in its University-Fogelson No. 1. The test topped the Ellenburger at 8,914 feet, was drilled to the total depth of 8,985 feet, plugged back to 8,965 feet to shut off bottom-hole water, and was completed for a daily flowing potential of 223 barrels of oil and 57 barrels of water.

The Stanolind found productive Pennsylvanian limestone in its Eva B. Kayser No. 1 in the area known at the Addis Deep field. The test was drilled to the total depth of 13,620 feet in dry Ellenburger dolomite, and was plugged back to complete through perforations from 8,495 to 8,565 fet for a daily pumping potential of 160 barrels of fluid, 97 per cent oil plus 3 per cent basic sediment and water. The test was drilled on subsurface geology.

The Plymouth Oil Company found the Clear Fork dolomite productive in the Andector field in the northwest corner of the county in its Cowden No. 3–A–12. The total depth was 6,285 feet, in dolomite; the top of the producing zone was at 6,200 feet; and the well was completed, flowing a daily potential of 168 barrel after being treated with 1,000 gallons of acid. Other wells were completed in the same producing zone in this part of the county scattered over a large area, indicating a large Clear Fork producing area.

The TXL area was actively drilled during the year, 61 oil wells being completed in the Ellenburger dolomite, and 29 in the Devonian chert. In all, 105 wells were drilled, 4 of which were dry.

Andector Ellenburger field had a total of 26 successful completions with no

TABLE VI

SUCCESSFUL NEW-FIELD WILDCATS COMPLETED IN 1947

County	Operator	Farm	Location	Total Depth (Feet)		Initial Production BOPD	Prod. Form.	Discovery Method*	Pool—New or Extended
				Drilled	Producing				
TEXAS									
Andrews	Fred Turner	Fisher 1	Sec. 16, Blk. A-36	4,505	4,505	P. 135 BO 24 hrs.	San Andres	Sb, T	Prorated with Deep Rock
	Sinclair	Univ. 173 —1	Sec. 25, Blk. 13, Univ.	9,840	9,840	1,036	*Devonian	Sm	Shafter Lake—Devonian
	Cody Oil Co. (Globe O&R Co.)	Lockhart & Brown 1-A	Sec. 20, Blk. A-41, PSL	8,706	4,667	160+5% sul. wtr.	San Andres	Sb	Fuhrman—Mascho
	Atlantic	Texas Univ. 1-E	Sec. 18, Blk. 12, Univ.	8,817	8,817	156+210 BWPD	*Devonian	Sm	Block 12—Devonian
Crane	Gulf	Univ. "HH" 1-E	Sec. 3, Blk. 31, Univ.	11,060	10,920	3,236	*Ellenburger	Sm	University—Waddell
	Texas	Connell 31	Sec. 29, Blk. B-16, PSL	9,964	4,690	299	San Angelo	Sb, Sm	Jordon "4500"
Coke	Sun	Jamison 1	Sec. 315, Blk. 1-A, H&TC	7,130	6,395	F. 248 BO 24 hrs.	*Penn.	Sm	Jamison
	Sun	J. B. Walker 1	Carl Brockhuyson #506	6,260	6,260	444	*Penn.	Sf, Sm	South Jamison
Crockett	Byrd & Frost	Mayberry 1	Sec. 39, Blk. 31, H&TC	7,796	6,362	1,391	Wolfcamp	Sb, Cd	Tippett
	Cities Service	Owens "B" 1	Sec. 6, Blk. GG	8,264	5,685	596	Wolfcamp	Sb	Clara Couch Wolfcamp
	Continental	Univ. "A-12" 1-S	Sec. 12, Blk. 47, Univ.	2,175	2,175	17	San Andres	Cd	Block 47
	Gar-Ter	Weiner-Vaughn 1	Sec. 86, Blk. OP, GC&SF	1,501	1,501	216+8% sul. wtr.	San Andres	Sb	Vaughn
	Gulf	University "R" 1	Sec. 14, Blk. 29, Univ.	1,685	1,685	108	Grayburg	Cd	Lancaster Hill
	Humble	Mitcham 1	Sec. 12, Blk. AB, D&SE	8,165	8,145	488	*Ellenburger	Sm	Childress
	Loffland	Cox 1	Sec. 40, Blk. ST, TCRR	1,137	1,137	P. 25 BOPD	San Andres	Cd	Loffland
	Moore	Neal 1	Sec. 2, D. L. Carver	2,392	2,392	P. 12 BO 24 hrs.	San Andres	Cd	Friend
	Sinclair Prairie & Atlantic	Univ. "66" 1	Sec. 30, Blk. 46	7,680	7,658	1,310	*Ellenburger	Sm	Midway Lane
	Stanolind	Univ. "TT" 1	Sec. 12, Blk. 39, Univ.	9,000	8,080	63+1 BWPD	*Penn.	Sm	Block 39
Ector	Phillips & Texas	McEntire 1	Sec. 18, Blk. 44, 1-N, T&P	8,640	8,640	2,616	*Ellenburger	Sb, Sm	Andector (may be new field)
	Humble	Yarbrough & Allen 1	Sec. 18, Blk. B-14, PSL	10,620	10,620	867	*Ellenburger	Sm	Yarborough & Allen
	Stanolind	Kayser 1	Sec. 34, Blk. 43, 2S, T&P	13,620	8,573	160	*Penn	Sb, Sm	Addis Deep
Gaines	Cities Service	Riley 1	Sec. 361, Blk. G, CCSD&RGNG	7,251	7,251	42+16% BS&W	Clearfork	Sb, Sm	Riley
	Honolulu	White 1	Sec. 404, Blk. G, CCSD&RGNG	7,003	7,003	161.04+3% BWPD	Clearfork	Sb, Sm	North Riley
Hale	Stanolind	Fisher 1	Sec. 5, Blk. CL, ELRR	6,992	6,992	1,341	*Penn.	Sm	Petersburg
Kimble	Phillips	Buck 1	Sec. 373, Abs. 19, W. M. Berry	1,164	898	G. 206,000 CF gas PD	*Penn.	Cd	South Junction
Midland	Humble	Turner 1	Sec. 43, Blk. 37, 2S, Holcombe	11,445	8,565	139	Wichita	Sm	South Midland
Mitchell	Tobe Foster	Brennand 1	Sec. 4, Blk. 28, 1-N, T&P	2,889	2,889	55+10% SW	Clear Fork	Sb, T	Brennand
Pecos	Phillips	Omega 1	Sec. 11, Blk. 134, T&St.L	3,380	1,501	687 MCF	Rustler	Cd	Round-Kincaid
	Pure	Oates "204" 1	Sec. 204, Blk. 3, T&P	845	845	39+501 BWPD	Rustler	Sf	Oates
Reagan	Continental	Univ. "B-8" 1	Sec. 8, Blk. 49, Univ.	2,465	2,280	7	San Andres	Sb, Cd	Friend
	Moore Expl. Co.	Friend 1	Sec. 1, Georgetown RR	2,582	2,592	10	San Andres	Sb	Friend
Reeves	Argo	Roberts 1	Sec. 294, Blk. 13, H&GN	14,073	10,860	71+10% water	Wolfcamp	G, Mg	Verhalen
	Texzona	Tunstill 1	Sec. 10, Blk. 56, T-S, T&P	3,308	3,308	71+50% water	Deleware	Sb	Tunstill
Terry	Amerada	Adair 1	Sec. 4, Blk. C-37, PSL	4,945	4,945	150; 3% sul. wtr.	San Andres	Sb, Sm	Adair
Upton	Slick & Urschel	Alford 1 (OWDD)	Sec. 50½, Blk. Y, B. P. Scott	12,022	12,011	833	*Ellenburger	Sb, Sm	Benedum

TABLE VI—(*continued*)

County	*Operator*	*Farm*	*Location*	*Total Depth (Feet)*		*Initial Production BOPD*	*Prod. Form.*	*Discovery Method**	*Pool—New or Extended*
				Drilled	*Producing*				
			NEW-POOL WILDCATS						
Andrews	Texmass	Parks Est. 1	Sec. 21, Blk. A-34, PSL	4,625	4,625	88+7% BS&W	San Andres	—	Means
	Shell	Lineberry 1	Sec. 7, Blk. A-40, PSL	10,414	10,414	421	*Ellenburger	—	Nelson
Crockett	C. W. Brown	Hoover "D" 1	Sec. 10, Blk. 1, GC&SF	1,551	1,551	P. 77	Queen	—	Simpson
	Ledge Pet. Co.	Bouscaren "A" 1	Sec. 25, Blk. GG, HE&W	2,385	2,385	20 million CF gas daily	San Andres	—	Noelke
	Moore Expl. Co.	Hoover 1-4	Sec. 4, Blk. FF, B&B	2,433	2,433	P. 55	San Andres	—	Shannon
	R. P. Phillips	Magnolia-Shannon 1	Sec. 24, Blk. Q, GC&SF	2,379	2,360	10+5 BWPD	San Andres	—	Shannon
Mitchell	Cole-Darden	S. R. Coleman 1	Sec. 76, Blk. 97, H&TC	2,875	2,875	P. 339	Clear Fork	—	Coleman Ranch
Sutton	S. B. Roberts	King 1	Sec. 26, Blk. 12, GH&SA	5,475	3,692	G. 3,600,000 CF gas PD.	Penn.	—	Allison
Upton	Marshall & Smith	Cole 1	Sec. 94, Blk. Y, F. Rooney	2,835	2,835	P. 55	San Andres	—	Crane-Cowden
Winkler	F. T. Hogan	Hendricks 1	Sec. 22, Blk. B-12, PSL	2,940	2,940	P. 32	Queen	—	Richardson
			DEEPER-POOL TESTS						
Andrews	Magnolia	Cowden 2-B	Sec. 4, Blk. A-55, PSL	8,365	8,345	535	*Silurian	—	Dollarhide-Silurian
	Pure	Cowden 1	Sec. 24, Blk. A-52, PSL	10,210	10,140	637 BO+30% wtr.	*Ellenburger	—	Dollarhide-Ellenburger
	Fullerton	Jackson 14-D	Sec. 17, Blk. A-32, PSL	10,534	8,290	1,422	*Devonian	—	Fullerton North Devonian
Cochran	Stanolind	M. J. Hall 1	Sec. 13, Blk. L, PSL	11,166	10,378	321	*Penn	—	Landon Strawn
Ector	Gulf	Goldsmith 421-D	Sec. 15, Blk. 44, 1S, T&P	9,811	8,022	131+161 BWPD	*Devonian	—	Goldsmith Devonian
	Gulf	Fogelson 1-A	Sec. 7, Blk. 35, Univ.	8,985	8,965	223+57 BWPD	*Ellenburger	—	Jordan Ellenburger
	Gulf	Goldsmith 430-E	Sec. 15, Blk. 44, 1S, T&P	9,645	9,565	301	*Ellenburger	—	Goldsmith Ellenburger
	Gulf	Goldsmith 437	Sec. 28, Blk. 44, 1S, T&P	6,700	5,700	1,029	Clear Fork	—	Goldsmith "5,600"
Gaines	Amerada	Riley 9	Sec. 229, Blk. G, WTRR	6,898	6,600	147	San Angelo	—	Seminole San Angelo
			SHALLOWER-POOL TESTS						
Andrews	Fullerton	Wilson 124	Sec. 15, Blk. A-32, PSL	8,235	8,235	P. 156+20% salt water	Wolfcamp	—	Fullerton Wolfcamp
	Plymouth	R. B. Cowden 1	Sec. 1, Blk. 45, 2N, T&P	8,767	4,250	F. 7.1 mil CF gas daily	San Andres	—	Andector-San Andres
Ector	American Republics	TXL 1	Sec. 7, Blk. 45, 2-S, T&P	8,550	7,815	121	Wolfcamp	—	TXL Wolfcamp
	Plymouth	Cowden 3-A-12	Sec. 12, Blk. 45, 2-N, T&P	8,450	6,285	186	Clear Fork	—	Andector Clearfork
Ward	Stanolind	University "Y" 2	Sec. 13, Blk. 16, Univ.	2,800	2,800	131+15% BS&W	Yates	—	South Sealy Yates
			OUTPOSTS (SUCCESSFUL)						
Andrews	Stanolind 1-QQ	Univ.	Sec. 17, Blk. 11, Univ.	8,290	8,290	214	Devonian	—	Three Bar
	Stanolind 1-AB	Univ.	Sec. 16, Blk. 11, Univ.	8,191	8,191	299	Devonian	—	Three Bar
	Stanolind 1-AD	Univ.	Sec. 9, Blk. 11, Univ.	8,167	8,167	378	Devonian	—	Three Bar
	Stanolind 1-AF	Univ.	Sec. 16, Blk. 11, Univ.	8,266	8,266	466	Devonian	—	Three Bar
	Stanolind 1-AG	Univ.	Sec. 8, Blk. 11, Univ.	8,315	8,315	267	Devonian	—	Three Bar
	Stanolind 1-AM	Univ.	Sec. 21, Blk. 11, Univ.	8,300	8,300	406	Devonian	—	Three Bar
	Stanolind 1-AQ	Univ.	Sec. 20, Blk. 11, Univ.	8,415	8,415	107+4% sul. wtr.	Devonian	—	Three Bar

TABLE VI—(*continued*)

County	*Operator*	*Farm*	*Location*	*Total Depth (Feet)*		*Initial Production BOPD*	*Prod. Form.*	*Discovery Method**	*Pool—New or Extended*
				Drilled	*Producing*				
Cochran	L. G. Yarborough & W. A. Phillips	Keen 1	Labor 2, Lge 84, Schackelford CSL	4,843	4,843	246+2% wtr.	San Andres	—	Levelland
Coke	Sun	H. H. Jamison 1	Sec. 253, Blk. 1-A, H&TC	6,462	6,462	196	Penn.	—	Jamison
	Sun	F. Jamison 2	Sec. 315, Blk. 1-A, H&TC	6,420	6,420	427	Penn.	—	Jamison
	Sun	W. I. Tubbs 1	Sec. 253½, Anthony	6,480	6,480	219	Penn.	—	Jamison
	Sun	F. Jamison 3	Sec. 315, Blk. 1-A, H&TC	6,565	6,565	610	Penn.	—	Jamison
	Sun	H. H. Jamison 2	Sec. 316, Blk. 1-A, H&TC	6,392	6,392	327	Penn.	—	Jamison
	Sun	C. E. Mather 1	Sec. 459, Blk. 1-A, H&TC	6,436	6,436	130	Penn.	—	Jamison
	Sun	H. H. Jamison 3	Sec. 316, Blk. 1-A, H&TC	7,150	6,501	354+2.7% wtr.	Penn.	—	Jamison
	Sun	Walker 1	Sec. 326, Blk. 1-A, H&TC	7,170	6,420	94	Penn.	—	Jamison
Crane	Bertrand & Bradford	Tubb "A" 1	Sec. 17, Blk. 32, PSL	4,560	3,055	787	San Andres	—	Sand Hills McKnight
	Gulf	Waddell 101-E	Sec. 27, Blk. B-25, PSL	10,835	10,835	1,104	Ellenburger	—	University-Waddell
	Phillips	Univ. "P" 1	Sec. 41, Blk. 31, Univ.	9,005	9,005	423	Devonian	—	Block 31-Devonian
Crockett	Armer & Staley	Hoover 1	Sec. 17, Blk. 1, GC&SF	2,110	2,110	P. 70 BO 7 hrs. & pumped off	San Andres	—	Shannon
	Continental	1-S Univ. A-8	Sec. 8, Blk. 47, Univ.	2,200	2,200	P. 17	San Andres	—	Block 47
	Continental	1-S Univ. A-9	Sec. 9, Blk. 47, Univ.	2,355	2,200	P. 3+6% sul. wtr.	San Andres	—	Block 47
Ector	Gulf	1-Si Cowden	Sec. 3, Blk. 45, T-1-N, T&P	8,166	8,166	850	Silurian	—	North Goldsmith Silurian
	Phillips	Blakeney 2	Sec. 7, Blk. A, PSL	8,495	8,495	1,550	Ellenburger	—	Andector
	Phillips	Rickson 1	Sec. 3, Blk. 45, T1N, T&P	8,157	8,157	1,022	Silurian	—	North Goldsmith Silurian
	Texas Co.	McDonald 10	Sec. 47, Blk. B-16, PSL	8,883	8,883	457	Ellenburger	—	Jordan Ellenburger
	Phillips	Embar 6	Sec. 17, Blk. 44, T1N, T&P	8,535	8,535		Ellenburger	—	Andector Ellenburger
	Shell	Cochran 1-A	Sec. 34, Blk. 46, T1N, T&P	8,150	8,150	P. 39	Devonian	—	TXL Devonian
	Phillips	TXL 1-P	Sec. 29, Blk. 45, T1N, T&P	8,482	7,960	279	Devonian	—	TXL Devonian
Ector	Phillips	Forbess	Sec. 26, Blk. B-15, PSL	8,957	8,957	201	Ellenburger	—	Penwell Ellenburger
	Humble	Cowden et al. 1-G	Sec. 1, Blk. 45, T1N, T&P	8,635	8,635	152+152 B salt wtr./24 hrs.	Ellenburger	—	Andector
	Shell	TXL 1-H	Sec. 39, Blk. 45, T1S, T&P	5,765	5,765	P. 147	Clear Fork	—	TXL Clear Fork
Gaines	Stanolind	T. S. Riley 3-B	Sec. 3, Blk. H, D&W	2,943	2,943	7.25 million CF gas daily	Yates	—	Cedar Lake
	Skelly	M. S. Doss 1	Sec. 394, Blk. G, CCSD&RGNG	6,940	6,940	P. 99	Clear Fork	—	North Riley
	Los Nietos	J. A. Sparks 1	Sec. 396, Blk. G, CCSD&RGNG	7,290	6,934	P. 155 BF/24 hrs. cut 5% salt wtr.	Clear Fork	—	North Riley
	McAlister Fuel	S. E. W. Bice	Sec. 9, Blk. C-31, PSL	4,903	4,903	P. 148+6% wtr.	San Andres	—	Adair
Garza	Progress Pet.	Rogers 1	Sec. 1,231, J. V. Massey	3,024	3,024	P. 22+33 bbl. wtr.	San Andres	—	Post
Glasscock	Fitting	W. R. Settles 1	Sec. 158, Blk. 29, W&NW	1,437	1,437	P. 27+3% wtr.	San Andres	—	Howard-Glasscock
Hockley	Constantine	Coble 1-A	Labor 50, Lge. 69, Hardeman CSL	4,855	4,855	630	San Andres	—	Levelland
	Livermore	DeLoche 1	Lab. 24, Lge. 78 Reeves CSL	4,783	4,783	124	San Andres	—	Levelland
	Ralph Lowe	Montgomery 1	Lab. 22, Lge. 70, Val Verde CSL	4,840	4,840	190	San Andres	—	Levelland
	Fitzgerald	Coble 1	Lab. 46, Lge. 69, Hardeman CSL	4,830	4,830	486	San Andres	—	Levelland
	Stanolind	TLM "C" 1	Lab. 5, Lge. 30, Baylor CSL	4,853	4,853	P. 61 BO+10% wtr.	San Andres	—	Levelland

TABLE VI—(*continued*)

County	Operator	Farm	Location	Total Depth (Feet)		Initial Production BOPD	Prod. Form.	Discovery Method*	Pool—New or Extended
				Drilled	Producing				
	Yarborough & Phillips	Coble 5-B	Tr. 41, Lge. 68, Hardeman CSL	4,855	4,855	736	San Andres	—	Levelland
	Seaboard	Wrenchey 1	Lab. 25, Lge. 732 Taylor CSL	4,901	4,802	P. 177	San Andres	—	Levelland
	E. C. Lawson	Coble 1-A	Lab. 35, Lge. 68, Hardeman CSL	4,860	4,860	—	San Andres	—	Levelland
	Stanolind	Ripley 1	Lab. 20, Lge. 72, Val Verde CSL	4,876	4,876	P. 66 BO & 8 bbl. salt wtr.	San Andres	—	Levelland
	Stanolind	Bozeman 1	Lab. 1, Lge. 43, Rains CSL	4,889	4,889	262	San Andres	—	Slaughter
Kent	Humble	J. Boren 1	Lab. 23, Lge. 81, Blk. 5 H&GN	7,800	7,800	P. 19+74% sul. wtr.	Ellenburger	—	Polar
	Humble	Elkins 2	Sec. 37, Blk. 5, H&GN	7,905	7,905	198+8% sul. wtr.	Ellenburger	—	Polar
Reeves	Louis Crouch & Texzona	J. Camp 1	Sec. 14, Blk. 56, T-2, T&P	3,298	3,298	65	Delaware	—	Tunstill
Scurry	J. Odstrcil	House 1	Sec. 3, Blk. 1, I. P. Smith	1,694	1,694	P. 164	San Andres	—	Sharon Ridge
Terry	Amerada	Elkins 1	Sec. 5, Blk. C-37, PSL	4,955	4,955	SW 474	San Andres	—	Adair
Winkler	Magnolia	State-Walton 1	Sec. 7, Blk. B-3, PSL	10,640	10,640	F. 180+39 B wtr. 3/16 ck.	Ellenburger	—	Kermit Ellenburger
	Stanolind & Shell	Wheeler "F" 1	Sec. 16, Blk. 46, T1S, T&P	10,615	10,615	343	Ellenburger	—	Wheeler Ellenburger
						234	Devonian	—	Wheeler Devonian
NEW MEXICO									
			NEW-FIELD WILDCATS						
Eddy	Orcuft	Kopple 2	19-17S-27E	1,903	1,815	115	San Andres	Sb	Logan Draw
Lea	Devonian	Brown 1	19-9S-38E	5,011	5,011	141+14% wtr.	San Andres	Sm	Sawyer
	Texas	Garrett 1	22-16S-38E	5,760	5,690	15+15 BOPD wtr.	San Andres	Sm	Garrett
			NEW-POOL WILDCATS						
Lea	Mid-Continent	State "15" 1	16-21S-37E	6,700	6,675	432	Clear Fork (Yeso)	Sb, T	Drinkard
	Stanolind	Southland Royalty 1	9-21S-37E	6,684	6,684	301	Clear Fork	Sb, T	Drinkard
	Gulf	Amanda 1	25-22S-37E	7,335	7,174	3.31 million CF daily	Clear Fork	Sb, T	Drinkard
			DEEPER-POOL TESTS						
Eddy	Harvey Yates	Ballard "B" 3	18-18S-29E	2,660	2,660	F. 75	Grayburg	Sb	Loco Hills
Lea	Olsen	Wimberly 1	23-25S-37E	9,152	6,239	2.82 million CF daily+25 bbl. condensate	San Angelo (Yeso)	Sb	Justis
			OUTPOSTS						
Lea	Emperor	State 1	32-16S-32E	4,500	3,890	24	San Andres	Sb	Maljamar
	Texas & Pacific C&O	State "A" Acct 1#20	13-23S-36E	3,231	3,231	F. 8,000,000 CFPD (gas well)	Yates-Seven Rivers	Sb	Cooper-Jal
	Cole & Darden	Phillips State 1	30-17S-34E	4,760	4,760	305	San Andres	Sb	Vacuum
	Gulf	McCormick 11	32-21S-37E	8,318	7,221	487	*Silurian	Sb	McCormick
	Amerada	Hare 6	33-21S-37E	8,165	7,898	334	McKee (Simpson)	Sb	Hare
	Gulf	Cole-State 4	16-22S-37E	7,651	7,456	558 in 16 hrs.	McKee (Simpson)	Sb	South Hare

* Sf—surface, Sb—subsurface, T—trend, Cd—core drilling, Sm—seismic, G—gravity, Mt—magnetic.

dry holes. The Phillips and The Texas Company's McEntire No. 1, 2 miles southeast of the field, was completed for a natural daily flowing potential of 2,616 barrels per day through perforations from 8,430 to 8,480 feet, and may be a new field or possibly a long extension of the Andector field. This test was outstanding because of the exceptional thick productive Ellenburger. The test topped the formation at 8,060 feet and drilled to 8615 feet before the water table was reached. The Phillips' Blakeney No. 2, 1½ miles southeast of the McEntire, was completed for a daily natural flowing potential of 1,552 barrels from open hole from 8,472 to 8,495 feet, with the Ellenburger topped at 8,475 feet. This well is an extension of the pool from which the McEntire No. 1 produces. Both of these are credited to subsurface geology.

The Phillips Petroleum Company's TXL No. 1–M established the low structural position of the pre-Permian beds between the TXL and Goldsmith Ellenburger producing areas. It logged the top of the Ellenburger approximately 1,200 feet lower than the structurally high wells in these two producing areas.

The Sunray Oil Corporation's Parker No. 1 furnished important regional information. The test showed very low structure south of the Goldsmith field, and at a total depth of 10,191 feet was still in Pennsylvanian rocks.

Winkler County, Texas.—No important wildcat discovery was made in Winkler County in 1947.

Activity continued at Keystone field with 124 oil-well completions and one dry hole. Completions in Ellenburger dolomite (Ordovician), Colby sand (Permian), and Silurian producing zones predominated.

Three geologically important deep dry holes were drilled in the central part of the county. The Carter's Wight No. 1, Sec 29, Block B–40, PSL, was drilled to the total depth of 12,400 feet, in Ellenburger dolomite; the Santa Fe's Wheeler No. 1, Sec. 21, Block B–6, PSL, was drilled to the total depth of 11,980 feet, in Ellenburger dolomite; and the Sunray's Sealy Smith No. 1, Sec. 31, Block A, G&MMB&A, was drilled to the total depth of 10,889 feet, in Devonian. Each well had thick beds of Pennsylvanian and Mississippian age which are commonly absent in the major pre-Permian fields.

Crane County, Texas.—The University Waddell Ellenburger field, of considerable commercial importance, was discovered by the Gulf's University "HH" No. 1–E, Sec. 3 Block 31, University Lands, drilled to the total depth of 11,060 feet in Ellenburger dolomite, and producing from this formation through perforations from 10,615 to 10,875 feet. On initial potential test, the well flowed 3,236 barrels of 46° oil per day on a tubing choke, after a 1,000-gallon acid treatment. Location of the discovery well was based on reflection-seismograph work. During drilling, drill-stem tests yielded important oil showings in the Devonian cherty limestone, the Fusselman (Silurian) cherty limestone, and three Simpson (Ordovician) sandstones. Accumulation is in porous zones of an anticlinal structure.

Crockett County, Texas.—The Tippett Wolfcamp field was opened in north-

TABLE VII

IMPORTANT DRY NEW-FIELD WILDCATS
(Includes all wells which were drilled to pre-Cambrian)

County	*Operator*	*Farm*	*Location*	*Total Depth (Feet)*	*Formation (Total Depth)*
TEXAS					
Coke	Union of California	McCutchen 1-A	Sec. 144, Blk. 1-A, H & TC	6,746	Cambrian
Concho	Hedrick	Garner 1	Sec. 9, Blk. 70, H & TC	2,237	Ellenburger
Concho	Nolen & Newman	Barr 1	Sec. 2, E. J. McCarty	3,337	Ellenburger
Concho	Richards, Patton & Greer	Smith 1	Sec. 609, German Immig.	4,035	Ellenburger
Concho	Southern Minerals	Henderson 1	Sec. 638, H & TC	4,093	Ellenburger
Crane	Gulf	Barnsley 1	Sec. 41, Blk. 32, PSL	8,565	Ellenburger
Crane	Gulf	Wristen Bros. 7-E	Sec. 17, Blk. B-28, PSL	8,345	Ellenburger
Crockett	Amerada	University 1 "CTA"	Sec. 23, Blk. 42, Univ.	9,104	Cambrian
Crockett	Humble	Childress 1	Sec. 5, CCSD & RGNG	9,260	Cambrian
Crockett	Hyde, Moncreif & Helmerich & Payne	Helbing 1	Sec. 16, Blk. QR, TTRR	9,000	Ellenburger
Crockett	Moore	Hoover 1-E	Sec. 1, Blk. GG	7,503	Ellenburger
Crockett	Moore	Halff 3-C	Sec. 69, Blk. 1, I & GN	6,914	Ellenburger
Crockett	Shell	University 1	Sec. 21, Blk. 30, Univ.	9,054	Cambrian
Crockett	Weiner	Vaughn 1	Sec. 86, Blk. OP, GC & SF	7,785	Ellenburger
Crosby	Humble	Montgomery 1	Sec. 5, B & B Heirs	9,707	Pre-Cambrian
Dickens	Humble	Matador 1-G	Sec. 8, Blk. C, C. V. Connelle	8,248	Granite
Dickens	Woodward	Williamson 1	Sec. 189, Blk. 1, I & GN	7,787	Granite
Ector	Humble	Vest 1	Sec. 17, Blk. B-8, PSL	11,667	Ellenburger
Ector	Phillips	TXL 1-M	Sec. 13, Blk. 45, T1S, T&P	10,845	Ellenburger
Ector	Sunray	Parker 1	Sec. 10, Blk. 44, T2S, T&P	10,191	Pennsylvanian
El Paso	Sorley	Jones 1	Sec. 17, Blk. 5, PSL	2,220	Granite
Floyd	Humble	Meriwether 1	Sec. 31, Blk. D-3, EL & RR	7,745	Ellenburger
Garza	Plymouth	Slaughter 1	Sec. 32, Blk. 2, T & NO	8,450	Ellenburger
Hale	Stanolind	Hegi 1	Sec. 7, Blk. 5, G. S. Stevenson	9,974	Granite
Kent	Humble	Blair 1	Sec. 44, Blk. 5, H & GN	7,925	Ellenburger
Lamb	Honolulu	Halsell 1	Lab. 19, Lge. 219, Castro CSL	9,138	Granite
Lamb	Seaboard	Jackson 1	Lab. 15, Lge. 680, State Cap. Lds	9,327	Granite
Lubbock	Honolulu	Rhodes 1	Sec. 8, Blk. E, GC & SF	10,471	Granite
Lynn	Honolulu	King 1	Sec. 424, Blk. 21, HE & WT	10,756	Granite
Menard	American Republics	Bradford 1	Sec. 29, J. B. Bassey	2,745	Pre-Cambrian
Midland	Humble	Mabel Floyd 1	Sec. 16, Blk. 37, T3S, T&P	11,342	Devonian
Mitchell	Humble	Pratt 1	Sec. 28, Blk. 25, T&P	8,131	Granite
Mitchell	Hurlbut	Wulfjen 1	Sec. 10, Blk. 13, H & TC	8,008	Ellenburger
Pecos	Abell	Dietrich-Eager 1	Sec. 20, Blk. 2, H & TC	5,400	Silurian
Pecos	Humble	University 1-K	Sec. 18, Blk. 16, Univ.	7,730	Ellenburger
Pecos	Pure	Harrison 1	Sec. 203, Blk. 3, T & P	11,815	Pennsylvanian
Pecos	Stanolind	Hinyard 1	Sec. 29, Blk. 144, T & STL	6,731	Granite
Presidio	Argo	Mitchell	Sec. 40, TWNG	9,993	Pennsylvanian
Reagan	Gulf	Hughes 1	Sec. 8, Blk. L, T&P	10,779	Ellenburger
Reagan	Humble	Sawyer 1-D	Sec. 78, Blk. 1, T&P	9,810	Ellenburger
Schleicher	Callery	Jones 1	Sec. 31, Blk. K, GH & SA	6,001	Ellenburger
Schleicher	Chapman	Robinson 1	Sec. 49, Blk. 1, GH & SA	6,513	Ellenburger
Schleicher	Grobel	Baugh 1	Sec. 8, Blk. M, GH & SA	6,591	Ellenburger
Scurry	Humble	Davis 1	Sec. 330, Blk. 97, H & TC	8,027	Ellenburger
Scurry	Humble	Harrell	Sec. 78, Blk. 2, H & TC	7,563	Ellenburger
Scurry	Ohio	Neal 1	Sec. 1, R. N. Miller	7,339	Ellenburger
Sutton	H. L. Hunt	Bundy 1	Sec. 71, A. Gray Survey No. 71	4,800	Ellenburger
Tom Green	Palmer	Oates 1	Sec. 52, Dist. 11, SPRR	5,805	Cambrian
Tom Green	Texas	Wilde 1	M. M. Boden Survey	5,300	Ellenburger
Ward	Phillips	University 1-B	Sec. 28, Blk. 16, Univ.	11,966	Pennsylvanian
Winkler	Carter	Wight 1	Sec. 29, Blk. 40, PSL	12,409	Ellenburger
Winkler	Santa Fe	Wheeler 1	Sec. 21, Blk. B-6, G & MMB & A	11,980	Ellenburger
Winkler	Sunray	Sealy-Smith 1	Sec. 31, Blk. A, G & MMB & A	10,889	Devonian
NEW MEXICO					
Chaves	Continental	Lankford 1	2-14S-26E	8,099	Schist
Chaves	Richfield	Comanche Unit 1	13-11S-26E	6,129	Granite
Chaves	Richfield	White 1 "3"	6-12S-29E	9,058	Schist
Chaves	Yates	Mullis 1	21-15S-29E	12,153	Granite
Eddy	Richfield	Lake McMillan 1	36-20S-26E	6,020	Wolfcamp

western Crockett County by the Byrd-Frost and Gulf Oil Corporation's Mayberry No. 1. The well tested dry in the Ellenburger dolomite, encountered at 7,694 feet, and plugged back to complete for a potential of 1,391 barrels of oil through perforations opposite Wolfcamp conglomerate beds from 6,325 to 6,340 feet. Two offsets were in the process of being completed early in 1948 and a fourth

TABLE VIII

DRY DEEPER-POOL TESTS

County	Operator	Farm	Location	Total Depth (Feet)	Footage Below Regular Producing Formation	Formation at Total Depth	Pool
TEXAS							
Andrews	Stanolind	University 1-AS	Sec. 21, Blk. 11, Univ.	9,115	815 (Devonian)	Silurian	Three Bar
Coke	Sun	Jamison 2-A	Sec. 253, Blk. 1-A, H&TC	7,114	750 (Penn)	Ellenburger	Jamison
Coke	Sun	H. H. Jamison 3	Sec. 316, Blk. 1-A, H&TC	7,141	640 (Penn)	Ellenburger	Jamison
Coke	Sun	Walker 1	Sec. 326, Blk. 1-A, H&TC	7,170	750 (Penn)	Ellenburger	Jamison
Crockett	J. I. Moore	Hoover 1-D	Sec. 17, Blk. 1, GC&SF	8,440	6,340 (San Andres)	Ellenburger	Shannon
Crockett	Humble	Owens 1-G	Sec. 6, Blk. GG, H&OB	8,092	1,312 (Wolfcamp)	Ellenburger	Clara Couch Wolfcamp
Ector	Stanolind	Faskin 1	Sec. 45, Blk. 42, 1N, GMMBA	7,503	2,853 (San Andres)	Clear Fork	Midland Farms
Ector	American Republics	TXL 1	Sec. 7, Blk. 45, 2S, T&P	10,736	2,186 (Wolfcamp)	Ellenburger	TXL Wolfcamp
Gaines	Amerada	Jones 2-A	Sec. 3, Blk. A-6, PSL	12,924	1,518 (Devonian)	Granite	Jones Ranch
Gaines	Amerada	Jones 1-D	Sec. 2, Blk. A-7, PSL	13,025	1,610 (Devonian)	Granite	Jones Ranch
Howard	Stanolind	Gaskin 1	Sec. 7, Blk. 33, 1S, T&P	10,366	7,116 (San Andres)	Ellenburger (?)	Moore
Winkler	Standard of Texas	Baird 13-26	Sec. 13, Blk. B-3, PSL	5,425	2,160 (San Andres)	Clear Fork	Kermit (?)
Winkler	Stanolind	Hendricks 35-A	Sec. 33, Blk. 26, PSL	13,815	11,015 (Seven Rivers)	Ellenburger	Hendricks
NEW MEXICO							
Eddy	Grayburg	Keeley 13-B	26-17S-29E	5,076	2,026 (Grayburg-San Andres)	Clear Fork	Grayburg Jackson
Lea	Skelly	Steeler 2	17-23S-37E	10,589	6,913 (Queen-Grayburg)	Ellenburger	Penrose Skelly
Lea	Mid-Continent	Christmas 1	17-22S-37E	6,684	3,034 (Queen-Grayburg)	Clear Fork	Penrose Skelly
Lea	Mid-Continent	Marshall 1	11-21S-36E	7,145	3,287 (Queen-Grayburg San Andres)	Clear Fork	Eunice Monument
Lea	Mid-Continent	Reeves 2	29-20S-37E	7,150	3,299 (Queen-Grayburg San Andres)	Clear Fork	Eunice Monument
Lea	Mid-Continent	Lynch 4	1-22S-37E	7,226	1,976 (Drinkard)	Granite	Drinkard

TABLE IX

IMPORTANT DRY OUTPOSTS

County	Operator	Farm	Location	Total Depth (Feet)	Formation at Total Depth
TEXAS					
Andrews	Sunray	Lockhart & Brown No. 1	Sec. 22, Blk. A-41, PSL	9,648	Silurian
Andrews	Stanolind	Sims No. 1	Sec. 16, Blk. A-39, PSL	10,960	Granite
Andrews	Stanolind	McCrea No. 1	Sec. 24, Blk. A-39, PSL	10,477	Granite
Andrews	Humble	Pinson No. 1	Sec. 13, Blk. A-40, PSL	10,861	Granite
Hale	Stanolind	Fisher No. 2	Sec. 5, Blk. CL, EL RR	8,394	Granite
Ward	Gulf	Bray "A" No. 1-Si	Sec. 6, Blk. 5, H & TC	8,170	Montoya
Crockett	Humble	Mitcham No. 2	Sec. 12, Blk. AB, J. Montague	9,270	Cambrian
Crockett	Humble	Smith No. 1	Sec. 1, BS & F	9,188	Cambrian

well was drilling. The discovery well was drilled on a subsurface anomaly checked by core drilling.

Pecos County, Texas.—Three dry holes, important geologically, were drilled in Pecos County, on the south end of the Central Basin platform. The Stanolind's Hinyard No. 1, Sec. 29, Block 144, T&SL Survey, on the south flank of the large buried granite mass at the south end of the Central Basin platform, drilled through an abnormally thick series of Wolfcamp (Permian?) beds before entering granite or granite boulders at 6,335 (?) feet, without finding any rocks from Pennsylvanian through Ordovician age. Although drilled on a Permian subsurface structure, the porosity of the Permian dolomites and limestones was too low to yield more than showings of oil and gas. The Humble's University No. 1–K, Sec. 18, Block 16, University Lands, on the east flank of the buried granite mass found Silurian and Ordovician rocks beneath the Permian, and was abnormally low on the Ellenburger dolomite topped at 7,680 feet. A few miles west the Permian lies on granite.

The shallow Toborg field had the second largest number of completions of all the actively developing fields. One hundred twenty producers and 15 dry holes were completed at an average depth of 405 feet in the Triassic productive sandstone underlying Cretaceous limestone and sandstone on the north edge of the Yates field.

SOUTHEASTERN SHELF

Crockett County, Texas.—A major field appears to have been opened by the Sinclair Prairie Oil Company and the Atlantic Refining Company in their University "66" No. 1. The test was completed, producing 1,311 barrels of oil per day from the Ellenburger, encountered at 7,396 feet. Four additional flush wells have been completed with three drilling in early 1948 in this field, which has been designated the Midway Lane Ellenburger field. This discovery is credited to refraction-seismic work.

The Continental Oil Company opened the Block 47 shallow field with its No. 1–S "A–12" well. The well was completed, pumping a daily potential of 17 barrels of oil per day from the San Andres (Permian) dolomite. This discovery was drilled after a near-by deep test had logged showings in this zone.

In southwestern Crockett County, the Gulf Oil Corporation opened the shallow Lancaster Hill field in its University "R" No. 1. The well was started as a stratigraphic test, and, after logging porosity and saturation in a basal Grayburg conglomerate produced 108 barrels of oil per day between 1,667 and 1,685 feet. Five additional wells have been drilled, two being completed as producers and three as dry holes.

The Clara Couch Wolfcamp field was opened in Crockett County in the Cities Service Oil Company *et al.* J. W. Owens No. 1–B, which produced 596 barrels of oil from 5,668 to 5,685 feet, after being plugged back from barren Ellenburger dolomite. The location was based on subsurface geology. Porosity conditions are apparently erratic, because offset tests have been dry holes and good producers.

TABLE X

Oil and Gas Fields and Pools by Formations
West Texas and Southeastern New Mexico
(As of December 31, 1947)

Geologic Age	*Formation*	*County*	*Field or Pool Names*
Pleistocene	Undifferentiated	Pecos	*Grassroots (?), *"Shallow Oil Field"
		Reeves	Toyah
Triassic	Undifferentiated	Crockett	Toborg (part of Yates) *4*
		Pecos	Toborg (part of Yates) *4*
Permian	Dewey Lake	Pecos	Richards
	Rustler	Pecos	Oates, Round-Kincaid (gas) (?)
	Castile	Reeves	*Anthony
		Eddy	Blackriver, Fenton
	Delaware Mountain	Loving	Mason, Wheat
		Pecos	Chancellor
		Reeves	Tunstill
		Ward	Lion, Hays (Quito), Monroe, *Pruitt, Scott, *Wilson
	Tansill	Eddy	Hale (gas), Scanlon (gas)
	Yates	Andrews	Block 12 (gas) *3*, Fullerton Yates *8*, Means (gas) *2*, Shafter Lake (gas)
		Eddy	Artesia (?) *4*, Barber, Benson, Burton, Empire *3*, Getty, Lusk, PCA, Red Lake *3*, Russel, Shugart, West Lusk
		Gaines	Cedar Lake (gas)
		Glasscock	Howard-Glasscock (gas) *3*
		Howard	Howard-Glasscock *8*
		Lea	Baish, Cooper-Jal (gas) *2*, Eaves *2*, East Lusk, Halfway, Lea, Lovington (gas) *3*, Lusk, Lynch, North Lynch, Rhodes, Salt Lake, San Simon, Skaggs (gas) *2*, West Eunice
		Pecos	Davis, Fort Stockton, Jackson (gas), Netterville, Payton, Pecos Valley High Gravity, Pecos Valley Low Gravity, Taylor-Link *3*, Westerman (gas), Yates Smith Sand *4*
		Ward	Byrd, Magnolia Sealy *2*, North Ward Estes *2*, Payton, Pecos Valley High Gravity, Pyote *2*, South Sealy Yates, South Ward *2*, Spencer *2*
		Winkler	Cheyenne (extension into Texas of Rhodes, N. Mex. field), Eaves *2*, Emperor *3*, Halley *2*, Henderson *2*, Hendrick *2*, Kermit 3, Leck *2*, North Ward Estes *2*, Scarborough
	Seven Rivers	Crockett	Noelke, Simpson
		Eddy	Fren
		Howard	Howard-Glasscock *8*
		Lea	Bowers, Cooper-Jal *2*, Eaves *2*, Grayburg-Jackson *4*, Langlie-Mattix *2*, North Lynch, Rhodes, South Eunice, Tonto, Watkins, West Eunice (?)
		Pecos	Jamison-Pollard, Lehn-Apco *2*, Magnolia Sealy *2*, Magnolia Sealy South, Patillo-Iowa, Pyote (?) *2*, Shearer, Shipley (?), *3*, South Ward *2*, Spencer (?) *2*, Ward North Estes *2*
		Winkler	Eaves *2*, Emperor *3*, Emperor Deep, Halley *2*, Henderson *2*, Hendrick *2*, Kermit *3*, Leck *2*, Ward North Estes *2*
	Queen	Chaves	Caprock
		Crockett	Hoover
		Eddy	Artesia *4*, Culwin, Grayburg-Jackson *4*, High Lonesome *2*, Maljamar *3*, North Shugart, Red Lake, Shugart, Turkey Track *2*
		Howard	Howard-Glasscock *8*
		Lea	Caprock, Corbin, Eunice-Monument *3*, Langlie-Mattix *2*, Maljamar *3*, Pearsall, Penrose-Skelly *3*, Young
		Pecos	Choate-Brown, Lehn-Apco *2*, Fromme, Masterson, Patillo-O'Neil, Penn-Shearer, Taylor-Link *3*, Walker *2*, White & Baker *3*
		Reagan	Big Lake *5*
		Ward	Dobbs, Shipley *2*
		Winkler	Emperor Deep *3*, Keystone Colby *8*, Richardson, Weiner Colby Sand
	Grayburg	Andrews	Fuhrman-Mascho *3*, Mabee, Means *2*, Midland Farms
		Crane	Crane Cowden *2*, Dune, Edwards, Ella Waddell, McCamey *2*, McElroy, Waddell *2*
		Crockett	Clara Couch *3*, Crockett, Lancaster Hill, Olson *2*, Shannon Grayburg *2*, World
		Ector	Douro, Foster, Johnson North Cowden *2*, South Cowden
		Eddy	Anderson, Artesia *4*, *Cave, Dayton *2*, East Dayton, Empire *3*, Grayburg-Jackson *4*, High Lonesome *2*, Leo, Loco Hills, Maljamar *3*, *Palmillo, Premier, Red Lakes *3*, Robinson *2*, South High Lonesome *2*, Square Lake *2*, Turkey Track *2*
		Glasscock	Howard-Glasscock *3*
		Howard	Howard-Glasscock *8*, Fairview, Moore, Morita
		Lea	Arrowhead, Eunice-Monument *3*, Eighty-Four Draw, Hardy, Lovington *3*, Maljamar *3*, North Maljamar, Penrose Skelly *2*, Roberts, Robinson *2*, South Maljamar *2*, Vacuum *2*, West Roberts *2*
		Martin	Mabee
		Pecos	Fromme, Walker *2*, Wentz (gas) *3*, Yates *4*
		Reagan	Northwest Grayson, Big Lake *5*
		Upton	Crane Cowden *2*, Hurdle, McCamey *2*, McElroy, Webb-Ray
		Winkler	Keystone Lime

TABLE X—*Continued*

Geologic Age	*Formation*	*County*	*Field or Pool Names*
	San Andres	Andrews	Andector San Andres (gas) *3*, Deep Rock, Emma, Fuhrman-Mascho *3*, Fullerton San Andres *8*, Means *2*, West Andrews
		Chaves	Bitter Lake, *Comanche
		Cochran	Dean, Landon *2*, Rhodes, Slaughter
		Crane	Crane-Cowden *2*, Jordan *2*, Sand Hills McKnight *5*, Waddell *2*
		Crockett	Bean, Block 47, Clara Couch *3*, Loffland, Friend, Olson *2*, Shannon San Andres *2*, Todd San Andres *3*, Vaughn, Wyatt, Yates *4*
		Dawson	Scanlon, Sprayberry, Welch
		Ector	Goldsmith *4*, Harper, Jordan *2*, Midway, North Cowden Deep, North Goldsmith, Penwell *2*
		Eddy	Artesia *4*, Atoka, Daugherty, Dayton *2*, Empire *3*, Forrest, Grayburg-Jackson *4*, Henshaw, Logan Draw, Maljamar, McMillan, Robinson *2*, Square Lake *2*, South High Lonesome *2*
		Gaines	Adair, Cedar Lake *2*, *Kirk, Seminole *2*, Wasson *2*
		Garza	Garza, P.H.D.
		Glasscock	Carter, Howard-Glasscock *3*
		Hockley	Coble, Levelland, Slaughter, Yellowhouse
		Howard	Howard-Glasscock *8*
		Lea	Eunice-Monument *3*, Garrett, Hobbs, Lovington *3*, Maljamar *3*, Robinson *2*, Sawyer, Skaggs *2*, South Maljamar *2*, Vacuum *2*, West Lovington
		Mitchell	Sharon Ridge "1700"
		Pecos	Abell Permian *5*, Conry Davis *2*, Southeast Taylor Link (gas), Taylor Link *3*, White & Baker *3*, Yates *4*
		Reagan	Big Lake *5*, Friend, Grayson
		Scurry	Sharon Ridge "1700" *3*
		Sterling	*Clark
		Terry	Adair, Alex, Slaughter
		Tom Green	*Funk
		Upton	Crane Cowden *2*
		Winkler	Keystone Lime *8*
		Yoakum	Brahaney, Ownby, Waples Platter, Wasson *2*, West
	San Angelo	Andrews	Clabber Hill, Fullerton Glorieta *8*
		Crane	Crossett "3200" *2*, Jordan "4500," Sand Hills West *5*
		Gaines	Robertson *2*, Seminole San Angelo *2*
		Garza	*Justiceburg
		Howard	Howard-Glasscock *8*, Iatan-East Howard *2*, Snyder
		Irion	Irion
		Lea	Harrison (Yeso), Justis (gas), Paddock
		Scurry	Sharon Ridge *3*
		Ward	*Sand Hills (Gulf's Edwards No. 1) *5*
		Winkler	Emperor Holt *3*, Keystone Holt *8*, North Monahans *2*
	Clear Fork	Andrews	Block 12 *3*, Embar Permian *2*, Fullerton "8500" *8*, Fullerton *8*, Martin *5*, Union
		Crane	Barnsley, Gulf Henderson, Sand Hills Tubb *5*
		Ector	Andector Clear Fork *3*, Goldsmith Clear Fork, Goldsmith "5600" *4*, TXL Clear Fork *4*
		Gaines	Doss, North Riley, Riley, Robertson *2*, Russell, Wasson "66" *2*, Wasson "72" *2*
		Hale	Irish *2*
		Hockley	Smyer
		Howard	Howard-Glasscock *8*, Iatan-East Howard *2*, North Iatan, Vincent *2*
		Lamb	Anton *2*
		Lea	Blinebry (Yeso), Drinkard (Yeso) *2*, Weir
		Lubbock	Cravens, Lubbock, Stinnett
		Mitchell	Brennand, Coleman Ranch, Iatan-East Howard, Westbrook
		Pecos	Abell Permian *5*, Conry Davis *2*, Masterson "3500" *2*, Owego *2*
		Reagan	Big Lake *5*
		Scurry	Sharon Ridge "2400" *3*
		Ward	Monahans Clear Fork *2*
		Winkler	Keystone "5100" *8*, North Monahans *2*, Lowe
		Yoakum	Wasson "66" *2*, Wasson "72" *2*
	Wichita	Andrews	Martin *5*, Union
		Hale	Irish *2*
		Howard	Vincent *2*
		Lamb	Anton *2*
		Lea	Drinkard (Yeso) *2*
		Midland	South Midland
		Pecos	Abell *5*, McCandless (gas)
	Wolfcamp	Andrews	Fullerton Wolfcamp *8*
		Coke	Blackwell
		Crockett	Clara Couch Wolfcamp *3*, Tippett
		Ector	TXL Wolfcamp
		Pecos	McDer
		Reeves	Verhalen
		Upton	*Upland

TABLE X—*Continued*

Geologic Age	*Formation*	*County*	*Field or Pool Names*
Pennsylvanian	Undifferentiated	Coke	Jamison, South Jamison
		Cochran	Landon Deep *2*
		Concho	*Dodson, Eden, Eden (gas)
		Crockett	Block 30, Todd Deep Strawn *3*, West Todd
		Ector	Addis Deep
		Hale	Petersburg
		Howard	*Howard-Glasscock Crinoidal *8*
		Irion	Tankersley
		Kimble	*Bolt, *South Junction (?)
		Lea	Cass
		Menard	Morrow
		Midland	*Midland
		Pecos	White & Baker Strawn *3*
		Schleicher	*Opp, Page
		Sutton	Allison (gas), Wilson (gas)
Mississippian	Undifferentiated	Glasscock	Garden City
Devonian	Undifferentiated	Andrews	Bedford Devonian *2*, Block 12 *3*, Dollarhide Devonian *3*, Fullerton "8500" *8*, Fullerton Devonian *8*, North Fullerton, Shafter Lake Devonian, Three Bar
		Crane	Block 31 *2*, Crossett *2*
		Ector	*Goldsmith Devonian, Murchison, North Goldsmith Devonian *2*, TXL Devonian *4*, Wheeler Devonian *2*
		Gaines	Jones Ranch
		Winkler	Keystone Devonian 8, Wheeler Devonian *3*
Silurian	Undifferentiated	Andrews	Dollarhide Silurian *3*
		Ector	North Goldsmith Silurian *2*, TXL Silurian *4*
		Lea	McCormick
		Upton	McCamey Silurian *2*
		Ward	Shipley Silurian *2*
		Winkler	Keystone Silurian *8*, Wheeler Silurian *3*
Ordovician	Simpson	Andrews	Martin McKee *5*
		Crane	Humble Tucker (gas), *Jones, McKee, Sand Hills Ordovician *5*, Tucker
		Lea	Hare, South Hare
		Pecos	Abell *5*
	Ellenburger	Andrews	Bedford Ellenburger *2*, Dollarhide Ellenburger *3*, Embar Ellenburger *2*, *Fuhrman-Mascho Ellenburger *2*, Fullerton Ellenburger *8*, Fullerton "8500" Ellenburger *8*, Martin Ellenburger *5*, Nelson
		Crane	Block 31 Ellenburger *2*, Sand Hills Ellenburger West *5*, Sand Hills Ordovician *5*, University Waddell Ellenburger
		Crockett	Childress, Midway Lane, Todd Deep Ellenburger *3*
		Ector	Andector *3*, Goldsmith Ellenburger *4*, Jordan Ellenburger *2*, Penwell Ellenburger *2*, TXL Ellenburger *4*, Yarbrough & Allen
		Kent	Polar
		Lea	Brunson, *Dublin
		Pecos	Abell *5*, Apco-Warner, Heiner, Owego *2*, Wentz *3*
		Reagan	Barnhart, Big Lake Ellenburger *5*
		Upton	Benedum
		Ward	Monahans Ellenburger *2*
		Winkler	Kermit Ellenburger *3*, Keystone Ellenburger *8*, Wheeler Ellenburger *3*
Cambrian	Undifferentiated	Pecos	Wentz *3*

Symbols:
* Abandoned or dormant.
(?) Classification or name in doubt.
3 Figure following field or pool name indicates number of geologic formations under which that name appears for that county.

In northeastern Crockett County, the Humble's Elizabeth Mitcham No. 1 was completed in the Ellenburger dolomite, encountered at 8,030 feet, producing a potential of 488 barrels of oil per day, as the discovery well of the Childress Ellenburger field. Production has fallen off rapidly, and west and northeast offsets have been dry.

In the shallow Shannon field, John I. Moore's A. C. Hoover "D" No. 1 was drilled to the Ellenburger and abandoned at the total depth of 8,440 feet without showings. This test contributes important regional information regarding the pre-Permian of the Southeastern Shelf.

EASTERN PLATFORM

Coke County, Texas.—A new Pennsylvanian reef limestone discovery was made by the Sun Oil Company in its J. B. Walker No. 1, 4 miles south of the Jamison field. The well was completed between the depths of 6,230 and 6,260 feet producing 444 barrels of oil per day, and has been designated the South Jamison field. This discovery marks the second in the county to be based on surface geology by the Sun Oil Company, and a third field was found early in 1948. This undoubtedly will stimulate exploration for Pennsylvanian reef limestone production on the eastern side of the Permian basin.

In the northwest part of Coke County, the Jamison field, producing from Pennsylvanian reef limestone, was very active with the completion of 14 wells, only one of which was dry. Two wells were drilled to the Ellenburger dolomite, but failed to develop commercial production.

The Union Oil Company of California's Jim McCutchen No. 1 in the east-central part of Coke County, was drilled to the total depth of 6,746 feet, in Cambrian sandstone. The test was abandoned after failing to develop commercial production from the top of the Ellenburger which indicated some oil showings.

Mitchell County, Texas.—The Coleman Ranch field in northwestern Mitchell County, which produces from upper Clear Fork (Permian) dolomite, expanded rapidly in 1947, with the drilling of 26 producers and 3 dry holes.

Tom Green County, Texas.—An important wildcat in east-central Tom Green County was the Palmer Oil Corporation's Mrs. W. N. Oates No. 1, which was abandoned at the total depth of 5,846 feet, after finding encouraging gas and oil showings in the Ellenburger, encountered at 5400 feet.

MIDLAND BASIN

Upton County, Texas.—Probably the outstanding discovery of the year from a geological standpoint was Ellenburger production in the Slick and Urschel's Alford No. 1. This test is in the south part of the Midland basin and the discovery opens a large probable area which previously was not looked upon favorably. The total depth of the well is 12,022 feet, in Ellenburger dolomite, topped at 11,020 feet. With this penetration of more than 1,000 feet, the well had still not found the water table and was in gas and distillate or high-gravity oil. Through perforations from 11,885 to 11,985 feet the test produced 888 barrels of 56° oil per day. This discovery gives West Texas a new producing depth record.

Terry County, Texas.—Near the south-central part of Terry County and along the Terry-Gaines County line, the Amerada completed its Sam Adair No. 1 in the San Andres (Permian) dolomite between 4,875 and 4,925 feet, producing 608 barrels of oil per day. Thirty tests had been completed in this field at the end of the year. The area has been designated as the Adair field. Discovery is attributed to geophysical and subsurface information.

Gaines County, Texas.—The Cities Service's Riley No. 1 was completed be-

tween 7,045 and 7,237 in the Fullerton (lower Clear Fork, Permian) zone, pumping an initial daily potential of 42 barrels of oil daily plus 8 barrels of water. Discovery is credited to subsurface geology.

In the same part of Gaines County, about 3 miles northwest of the Cities Service well, Honolulu's White and Shelton No. 1 was completed in the Clear Fork between 6930 and 6959 for a daily pumping potential of 156 barrels of oil per day. Three additional small producers have been completed in this area.

NORTHWESTERN SHELF

Chaves County, New Mexico.—Four dry holes penetrated the entire sedimentary section to the basement rocks in this province. All found truncated Paleozoic rocks beneath the Permian. See table for these wells.

DELAWARE BASIN

Reeves County, Texas.—The Texzona Production Company opened a new Delaware sandstone field in the Delaware basin with its Tunstill Brothers No. 1. In Delaware sandstone topped at 3,268 feet the well flowed a daily potential of 71 barrels per day plus 50 per cent water. The discovery was designated the Tunstill field, and is attributed to surface and subsurface geology.

Three regionally important wells were drilled in this province: the Argo's Dora Roberts No. 1, the Pure's Harrison No. 1, and the Phillips' University No. 1-B. These tests had total depths of 14,073, 11,815, and 11,996 feet, respectively, and all stopped in Pennsylvanian rocks. These three tests demonstrate the thick sequence of Permian and Pennsylvanian rocks in the Delaware basin. The Argo's well was completed as a discovery in the Wolfcamp, which is the first production in this province in rocks lower in the section than the top of the Delaware Mountain group. The test was completed for 71 barrels of oil per day plus 10 per cent water from scattered productive streaks from 9,917 feet to the plugged-back total depth of 10,853 feet.

MATADOR UPLIFT

Hale County, Texas.—In southeastern Hale County, the Stanolind's E. L. Fisher No. 1 was completed in a Pennsylvanian reef limestone, producing 1,342 barrels of oil per day between the depths of 6,881 and 6,992 feet. While the well is from a new producing formation in the area, and opens the possibilities of other discoveries from the Pennsylvanian in that area, the well itself, which has been designated the Petersburg field, does not appear important because offsets in all directions have missed the reef and have been dry.

The Irish field in southwestern Hale County has been active with the completion of 22 producers and one dry hole in 1947.

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BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 984-987, 1 FIG., 3 TABLES

DEVELOPMENTS IN ARIZONA, WESTERN NEW MEXICO, AND NORTHERN NEW MEXICO IN 1947[1]

PAUL H. UMBACH[2]
Albuquerque, New Mexico

ABSTRACT

Seventeen wildcat wells were drilled; the total footage of 53,721 feet in western and northern New Mexico. As a result, two wildcat wells were placed on oil production.

Three wildcat wells were drilled in Arizona; the total footage of 10,271 feet; none was commercially productive.

Ten major companies and four independents have established offices within the area, and intense exploration and leasing activity centered in the San Juan basin.

Exploration showed an increase in activity, with eight seismograph crews in the San Juan basin and one in the Black Mesa basin.

INTRODUCTION

The district considered includes all of Arizona and the northern and western three-fourths of New Mexico (Fig. 1). Eleven fields, all in the San Juan basin, produced 418,778 barrels of oil and 8,245 million cubic feet of gas in 1947. These fields have an accumulated production of 10,381,511 barrels of oil and 60,273 million cubic feet of gas.

TABLE I

OIL AND GAS FIELDS IN NORTHERN NEW MEXICO

*Key Letter**	*Field Name*	*Producing Formation*	*Age*	*Gas or Oil*
		SAN JUAN COUNTY		
A	Barker	Dakota	Cretaceous	Gas
A	Barker (deep)	Paradox	Pennsylvanian	Gas
B	Blanco	Farmington, Pictured Cliffs, Mesa Verde	Cretaceous	Gas
C	Bloomfield	Farmington	Cretaceous	Oil
D	Fulcher Basin	Pictured Cliffs	Cretaceous	Gas
E	Hogback	Dakota	Cretaceous	Oil
F	Kutz Canyon	Pictured Cliffs and Dakota	Cretaceous	Gas and Oil
G	Oswell	Farmington	Cretaceous	Oil
H	Rattlesnake	Dakota	Cretaceous	Oil
I	Table Mesa	Dakota	Cretaceous	Oil
J	Ute	Dakota	Cretaceous	Gas
		MCKINLEY COUNTY		
K	Hospah	Hospah	Cretaceous	Oil
L	Red Mountain	Mesa Verde	Cretaceous	Oil

* See Figure 1.

[1] Manuscript received, March 16, 1948. Presented by title before the Association at Denver, April 26–29, 1948.

[2] District geologist, Stanolind Oil and Gas Company. In preparing this paper the writer has been assisted by the use of Stanolind Oil and Gas Company records which have been assembled as a result of the cooperation of other companies and independents working in the area.

DEVELOPMENT

The Fulcher basin-Kutz Canyon area of Pictured Cliffs gas production was extended 7 miles southeastward with the completion of the Florance Drilling Company's Hudson No. 1 in Sec. 10, T. 26 N., R. 10 W., San Juan County, New Mexico.

The Blanco gas area was extended northward approximately one mile by the Florance's Pierce (Federal) No. 1 in Sec. 17, T. 30 N., R. 9 W. However, the

TABLE II

SUCCESSFUL WILDCATS COMPLETED IN ARIZONA, WESTERN NEW MEXICO AND NORTHERN NEW MEXICO IN 1947

Key Number	*County*	*Well*	*Location*	*Depth (Feet)*	*Formation at Total Depth*	*Date*	*Remarks*
1	San Juan	Byrd-Frost et al. Hargrave 1	Sec. 4, T. 27 N., R. 10 W.	6,745	Morrison	12- 8-47	20 barrels oil per day after mechanical difficulties
2	San Juan	Petroleum Products' Santa Fe 1	Sec. 21, T. 21 N., R. 8 W.	4,707	Morrison	11-28-47	5 barrels of oil per day on pump

TABLE III

UNSUCCESSFUL WILDCATS COMPLETED IN ARIZONA, WESTERN AND NORTHERN NEW MEXICO

*Key Number**	*County*	*Well*	*Location*	*Depth (Feet)*	*Formation at Total Depth*	*Date*	*Remarks*
			NEW MEXICO				
3	San Juan	British-American's Cronican (Federal) 1	Sec. 23, T. 30 N., R. 16 W.	5,953	Chinle	9-27-47	D & A
4	McKinley	Petroleum Products' Lavington (Federal) 1	Sec. 22, T. 17 N., R. 6 W.	2,996	Morrison	12-22-47	D & A
5	McKinley	Gallup Dome's Ford 1	Sec. 22, T. 15 N., R. 18 W.	2,419	Chinle	11-14-47	D & A
6	Rio Arriba	Florance's Jicarilla 1	Sec. 23, T. 32 N., R. 3 W.	3,710	Mesa Verde	9 -6-47	D & A
7	Union	Pure Oil Co.'s Loleita Wiggins 1	Sec. 13, T. 31 N., R. 36 E.	3,514	Granite	3 -1-47	D & A
8	Union	Pure Oil Co.'s L. B. Sayre 1	Sec. 6, T. 30 N., R. 37 E.	3,564	Mississippian	6-30-47	D & A
9	Colfax	Neill and Alexander's Sauble 2	Sec. 1, T. 26 N., R. 24 E.	1,754	Santa Rosa	4- 1-47	D & A
10	Colfax	Neill and Steffan's Sauble 3	Sec. 3, T. 26 N., R. 24 E.	1,595	Santa Rosa	6-11-47	D & A
11	Guadalupe	Branch's Fee 1	Sec. 3, T. 10 N., R. 25 E.	1,038	Santa Rosa	7-17-47	D & A
12	Quay	Jensen Oil Co.'s First Nat'l. Bank 1	Sec. 27, T. 10 N., R. 31 E.	3,196	Permian	9-26-47	D & A
13	Torrance	Eidal Mfg. Co.'s Mitchell 1	Sec. 33, T. 44 N., R. 8 E.	3,592	Pre-Cambrian	12- 4-47	D & A
14	Valencia	Ringle's Tome 1	Sec. 34, T. 6 N., R. 4 E.	641	Tertiary	8- 1-47	D & A
15	Valencia	Ringle's Tome 1	Sec. 34, T. 6 N., R. 4 E.	670	Tertiary	9- 7-47	D & A
16	Valencia	Haddock Constr. Co.'s Gober 1A	Sec. 18, T. 5 N., R. 3 E.	6,347	Chinle	3- 1-47	D & A
17	Grant	Seyfried's State 1	Sec. 8, T. 27 N., R. 15 W.	1,070	Tertiary	7- 1-47	D & A
			ARIZONA				
18	Coconino	Burrell Collins' Collins 2	Sec. 22, T. 34 N., R. 8 E.	3,246	Cambrian	8-14-47	D & A
19	Maricopa	Dixie Oil Co.'s State 1	Sec. 34, T. 1 N., R. 5 W.	3,505	Tertiary	3- 1-47	D & A
20	Pima	ElRoy Oil & Development's Co.'s State 1	Sec. 8, T. 12 S., R. 11 E.	3,520	Tertiary	5- 2-47	D & A

* See Figure 1.

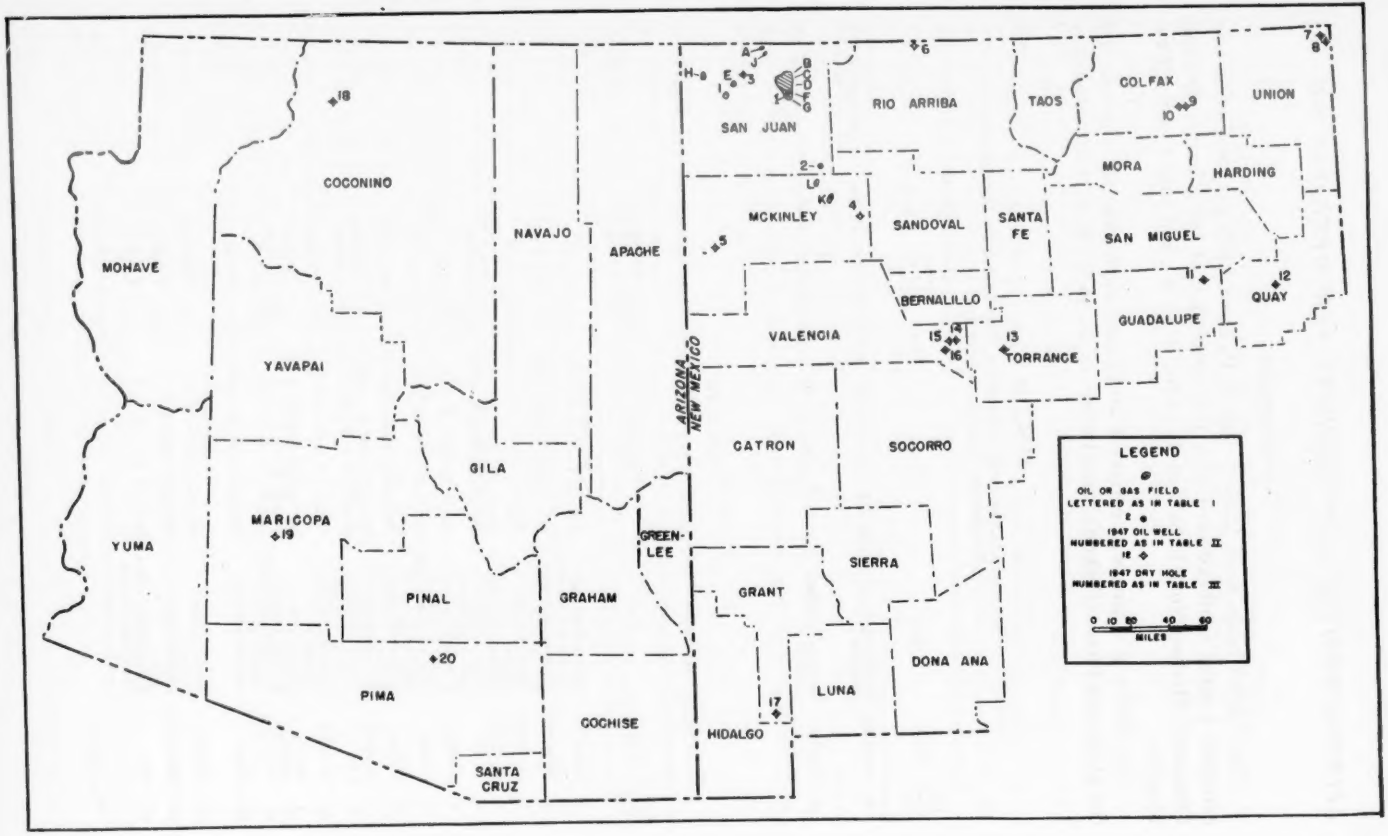
SAN JUAN
RIO ARRIBA
TAOS
COLFAX
UNION
MORA
HARDING
MCKINLEY
SANDOVAL
SANTA FE
SAN MIGUEL
COCONINO
NAVAJO
APACHE
MOHAVE
BERNALILLO
QUAY
GUADALUPE
VALENCIA
TORRANCE
YAVAPAI
ARIZONA
NEW MEXICO
CATRON
SOCORRO
GILA
MARICOPA
YUMA
GREEN-LEE
SIERRA
PINAL
GRAHAM
GRANT
DONA ANA
PIMA
LUNA
COCHISE
HIDALGO
SANTA CRUZ
LEGEND
OIL OR GAS FIELD LETTERED AS IN TABLE I
1947 OIL WELL NUMBERED AS IN TABLE II
1947 DRY HOLE NUMBERED AS IN TABLE III
0 10 20 40 60
MILES

FIG. 1

Florance's Shaw (Federal) No. 1 in Sec. 13, T. 30 N., R. 9 W., which was intended as a 4 mile eastward extension, failed to produce gas commercially.

The Barker Creek Dome Paradox gas production was extended one mile northeast by the Southern Union's Ute No. 18 in Sec. 11, T. 32 N., R. 14 W., which had an initial potential of 74,000,000 cubic feet of gas per day.

Ute Dome Dakota gas production was extended ¾ mile north by the Stanolind's Ute No. 3 in Sec. 35, T. 32 N., R. 14 W., with an initial potential of 4,500,000 cubic feet of gas per day.

Rattlesnake field was extended one mile southeast by Continental's Rattlesnake No. 119 in Sec. 13, T. 29 N., R. 19 W., which was placed on pump with an initial potential of 30 barrels of oil per day.

WILDCAT DRILLING AND EXPLORATION

Wildcat drilling consisted of twenty widely scattered wells (Fig. 1). Two wildcats in the San Juan basin were placed on production.

Lack of concentration of wildcats drilled in the area in 1947 is not to be considered an index to the interest displayed in geophysical and surface exploration. Intense geophysical and surface work was localized in the San Juan basin in northwest New Mexico, the Black Mesa basin in northeast Arizona, and the adjoining Paradox basin on the north in Colorado and Utah.

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BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 988-996, 1 FIG., 1 TABLE

DEVELOPMENTS IN NORTH AND WEST-CENTRAL TEXAS IN 1947[1]

JOHN H. STOVALL,[2] LESLIE W. DORBANDT,[3] AND WALTER L. AMMON[4]
Abilene and Wichita Falls, Texas

ABSTRACT

The North and West-Central Texas district reported 144 discoveries during 1947, including 50 new-field wildcats, 39 new-pool wildcats, 25 extensions, 24 deeper pool tests, and 6 shallower pay tests. This is comparable with a total of 102 discoveries reported during the preceding year.

In 1947, 2,979 wells were drilled, of which 835 were classified as exploratory. This is comparable with a total of 3,007 wells drilled during 1946, of which 653 were exploratory.

A total of 62,127,399 barrels of oil were produced in the district during 1947, as compared with a total of 57,840,000 barrels for 1946. This is an increase of 4,287,399 barrels. Wichita County continued as leading producer, although its production dropped to 10,894,984 barrels in 1947 from a total of 11,946,000 barrels in 1946.

The more important discoveries and developments of 1947 were: (1) continued discovery of new Caddo and Mississippian fields in Throckmorton and southern Young counties by subsurface geology and the seismograph, (2) the Acme or Mobley field in west-central Clay County, (3) the Bryant-Simpson field and Joy field extensions in Clay County, (4) the North Chalk Hills field in central Archer County, (5) the Lewis-Stuart field in Montague County, (6) the Standard of Texas' Covey-Bates No. 1 Strawn discovery in Grayson County, (7) the Cities Service's B. O. Manning No. 1 in northeastern Wise County, (8) Ellenburger fields in Callahan County, (9) the Round Top field in northeastern Fisher County, (10) Cisco production in Jones and Taylor counties, (11) renewed activity in the Bolivar field area in northwestern Denton County, (12) The Texas Company's Benson No. 1 and Continental's Gronow No. 1 Strawn discoveries in Montague County.

The 144 discoveries and extensions were as follows: 2 from the Permian, 25 from the Cisco, 8 from the Canyon, 69 from the Strawn, 16 from the Bend, 13 from the Mississippian, and 11 from the Ordovician.

The most successful exploratory methods in this district continued to be subsurface and the seismograph, or the combined use of these two methods.

INTRODUCTION

The North and West-Central Texas district, as covered by this paper, includes 50 counties with a total area of 45,000 square miles. Geographic features bounding this area are the Red River on the north, the Colorado River on the south, the High Plains on the West, and the Eastern Cross-Timbers Belt on the east.

The more important structural features of this district from the standpoint of the accumulation of oil are the Bend flexure, the Red River or Electra arch, the Muenster arch, and the Fort Worth, Hardeman, Baylor, and Marietta-Sherman basins. The Red River uplift trends from east to west from Clay County through Cottle County separating the Hardeman basin on the north from the Baylor

[1] Read by title before the Association at Denver, April 26–29, 1948. Manuscript received, March 19, 1948.

[2] Scout, Stanolind Oil and Gas Company, Abilene, Texas.

[3] Geologist, Stanolind Oil and Gas Company, Abilene, Texas.

[4] Geologist, Stanolind Oil and Gas Company, Wichita Falls, Texas. The writers wish to acknowledge with gratitude the suggestions and assistance of various members of the North Texas Geological Society and the Abilene Geological Society. These include T. F. Petty, L. L. Harden, John Moorhead, H. A. Russell, Charles Ise, J. J. Russell, Neal Potts, J. W. McDonald, L. C. Dennis, L. T. Teir, R. T. Drake, W. L. Haseltine, Glen Michel, A. R. Edwards, and R. L. McLaren. Jack B. Ryan aided in drafting the map. S. P. Ellison, Jr., aided through criticism of the preparation of the manuscript.

basin on the south. The Muenster arch is a continuation of the Amarillo-Wichita Mountain uplift southeastward from Oklahoma into Texas and separates the Marietta-Sherman basin on the east from the Fort Worth basin on the west. The Bend flexure extends northward from the Central Mineral region to southern Wichita County and separates the eastern Fort Worth basin from the western Baylor basin. The west-central part of the district is largely situated along, and on the west flnak of, the Bend flexure south of the Baylor basin.

DEVELOPMENT

Development in north and west-central Texas, in general, continued the trend of the past several years of increasing activity. The total number of wells drilled, however, remained approximately the same, though a larger percentage of them were exploratory in nature during the past year. In 1947, a total of 2,979 wells were completed as compared with a total of 3,007 for 1946. During 1947, 835 of these total drilled wells were classified as exploratory, as compared with 653 for 1946. Of these 835 exploratory wells drilled during the year, 144 were successful in discovering either new fields, pools, pays, or extensions. This is comparable with 102 similar discoveries during 1946.

Total production for the district increased from 57,840,000 barrels during 1946 to 62,127,399 barrels during 1947. Wichita County continued as the district's largest producer even though it dropped from 11,946,000 barrels in 1946 to 10,894,984 during the past year. The largest increases in production occurred in Clay, Montague, Archer, Cooke, Jack, Wilbarger, Young, Haskell, Throckmorton, Stephens, Coleman, and Taylor counties and accounted for the district's over-all gain.

The locations of the 1947 discoveries are shown on Figure 1. Table I lists the fields, producing formations, total depths, and classification of the wells shown in Figure 1. The classification follows that used by F. H. Lahee in his listing of exploratory wells. The brief discussions of the more important discoveries and developments which follow are not arranged in any order of attempted evaluation of importance, due to the effects of subsequent development and differences of opinion of any such evaluation.

1. The continued discovery and development of Caddo and Mississippian fields in Throckmorton and southern Young counties by Manning, Snowden, and others through the use of the reflection seismograph guided, in part, by subsurface geology is believed important. These methods have resulted in an exceptionally high percentage discovery rate in these counties.

2. The Acme or Mobley field in west-central Clay County had, at the close of the year, three completed producers from two Strawn zones, with further drilling underway. Subsequent development indicates that this may be an important field. Northwest and southwest extensions of the Strawn Joy field added considerably to the potentialities of this area.

3. The Phillips Petroleum Company's Bryant-Simpson field, in east-central

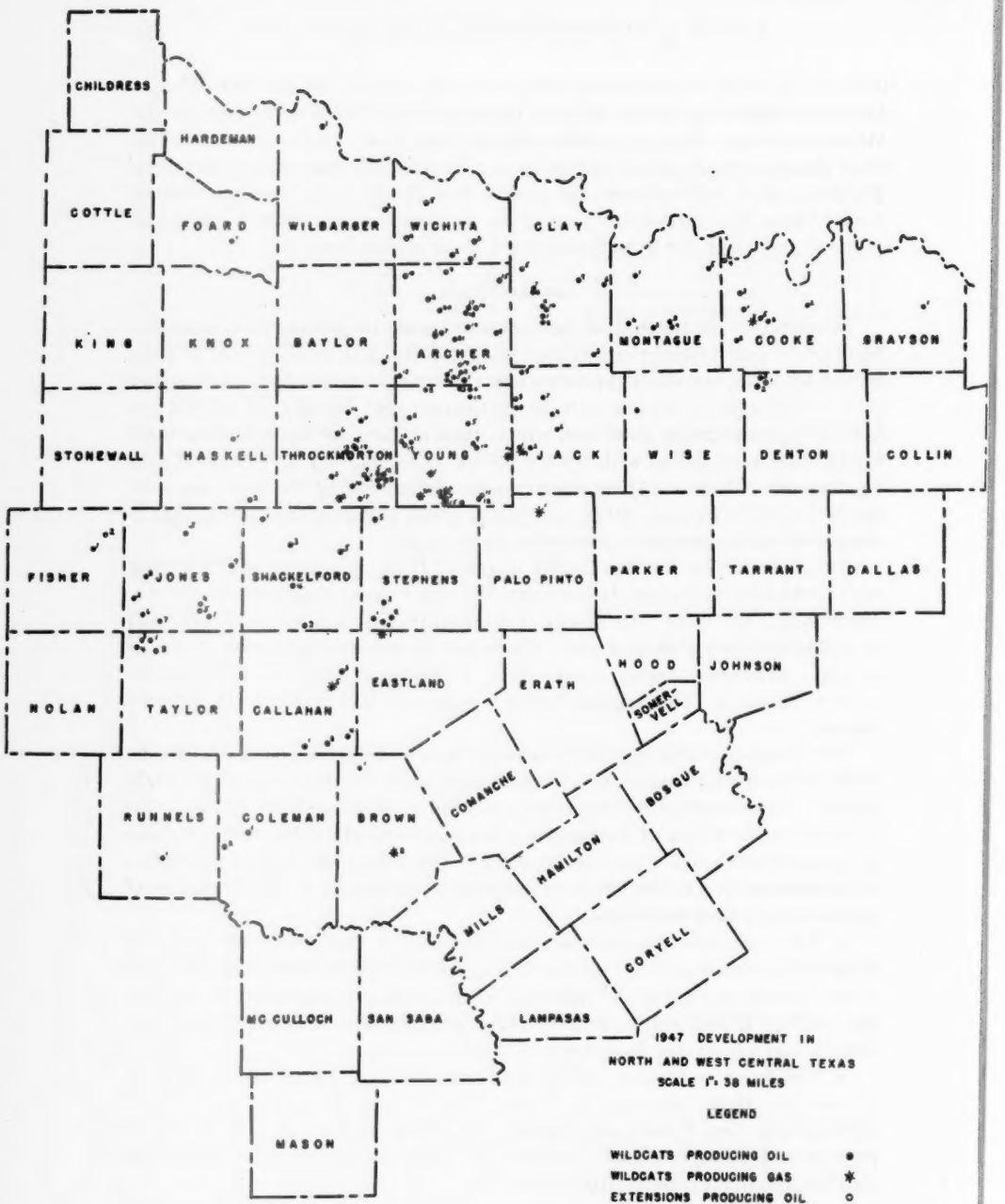

CHILDRESS
HARDEMAN
COTTLE
FOARD
WILBARGER
WICHITA
CLAY
KING
KNOX
BAYLOR
ARCHER
MONTAGUE
COOKE
GRAYSON
STONEWALL
HASKELL
THROCKMORTON
YOUNG
JACK
WISE
DENTON
COLLIN
FISHER
JONES
SHACKELFORD
STEPHENS
PALO PINTO
PARKER
TARRANT
DALLAS
NOLAN
TAYLOR
CALLAHAN
EASTLAND
ERATH
HOOD
JOHNSON
SOMERVELL
RUNNELS
COLEMAN
BROWN
COMANCHE
BOSQUE
HAMILTON
MILLS
CORYELL
MC CULLOCH
SAN SABA
LAMPASAS
MASON
1947 DEVELOPMENT IN
NORTH AND WEST CENTRAL TEXAS
SCALE 1" = 38 MILES
LEGEND
WILDCATS PRODUCING OIL
WILDCATS PRODUCING GAS
EXTENSIONS PRODUCING OIL
EXTENSIONS PRODUCING GAS

FIG. 1

Clay County, had three producing wells at the close of this year with four zones giving promise of commercial production.

4. The North Chalk Hill field, in central Archer County, had 10 wells at the close of the year producing from an upper Strawn sandstone and at least five drilling wells. Though development was progressing rapidly the boundaries of the field had not been defined by January, 1948.

5. In Montague County the first "Caddo" oil was produced in the Continental's Lewis-Stuart field and at the close of the year commercial production was indicated from 13 wells, and further development was underway. Approximately 1,000 productive acres are indicated in producing zone.

6. The Standard of Texas' Covey-Bates Unit No. 1, a Strawn discovery well, and the same company's H. L. Rising No. 1, a west offset, have drawn attentions to the Marietta-Sherman basin as a favorable area for future exploration. Three other tests were drilling at the close of the year in the vicinity. Two deep dry holes, the Denver Producing company's H. C. Rich No. 1 in northwestern Grayson and the Denver Producing Company's W. P. Luce No. 1 in northeastern Cooke County added to the interest in this area. Both are located very near the axis of the basin and drilled 13,252 feet and 10,006 feet of sediments, respectively, without completely penetrating the Pennsylvanian.

7. The Cities Service's B. O. Manning No. 1, in northwestern Wise County, focused attention on this part of the Fort Worth basin and may lead to increased exploration in this area during the coming year.

8. The discovery of three Ellenburger pools in Callahan County gave considerable encouragement for possibilities of deeper production in that county. These were the Cutbirth, Baum-Ellenburger, and the Isenhour-Ellenburger fields.

9. The discovery and subsequent development of the Round Top pool in northeastern Fisher County increased the exploration for Pennsylvanian reef reservoirs in the western part of the district.

10. Cisco discoveries in Jones and Taylor counties by Ungren-Frazier, Hunter, Hansbro, the Delhi Oil Corporation, and others were bright spots among the shallow discoveries in west-central Texas. Most of the discoveries were based on subsurface mapping in conjunction with surface work.

11. Renewed activity around the old Bolivar field in northwestern Denton County led to three small discoveries, which will very likely lead to additional development of this part of the Muenster arch.

12. In Montague County, The Texas Company's Benson No. 1 and the Continental's Gronow No. 1 were promising wildcat discoveries in the Strawn which may lead to important development, although none had been started at the close of the year.

During 1947, there were 144 discoveries and extensions of which 2 produced from the Permian, 25 from the Cisco, 8 from the Canyon, 69 from the Strawn (includes Caddo), 16 from the Bend, 13 from the Mississippian, 1 from the Simpson, and 10 from the Ellenburger.

TABLE 1

NEW POOLS AND EXTENSIONS DISCOVERED IN 1947

Map Index	County	Field	Operator	Farm Well No.	Location	Class	Producing Formation	Depth of Producing Form. (Feet)	Total Depth	Daily Initial Prod. (Barrels)	Method of Exploration
1.	Archer	A.B.C.	Burns	Andrews 1	Sec. 1,806, TE&L	Out-NP	Strawn	4,468	5,240	241	Sub-Seis.
2.	Archer	A.B.C.	Burns	Campbell 1-B	R. R. Rainey Sur. A-354	DP	Caddo	4,620	4,818	10	Sub-Seis.
3.	Archer		Cochran & Cain	Seay 1-D	Blk 56 Harris S/D	N.P.W.	Cisco	1,389	1,389	25	Sub.
4.	Archer	Daume	Cooper	Hawley 1	Sec. 2, SP RR A-941	Out-Ext.	Strawn	4,201	4,201	96	Sub.
5.	Archer		Dublin	Campbell 1	J. Ruddell Sur.	N.P.W.	Cisco	990	1,079	9	Sub.
6.	Archer		Dublin	Campbell 25	Sec. 1,382, TE&L	Out-NP	Cisco	988	992	100	Sub.
7	Archer		Fortex	Kendal 1	Lot. 97, J. D. Harris S/D	N.P.W.	Cisco	1,189	1,510	50	Sub.
8.	Archer	Wilson	Fortex	Wilson 1-A	Sec. 90, ATNCL	Out-Ext.	Cisco	1,608	1,608	90	Sub.
9.	Archer		Gouchie	Conrady 1	Lot 23, Blk. 4 Clark & Plumb	N.F.W.	Cisco	1,137	1,155	3	Sub.
10.	Archer	N. Chalk Hill	Grace	Wilson 1	Sec. 72, ATNCL	Out-Ext.	Strawn	4,020	4,020	1,248	Sub.
11.	Archer		Graham	Campbell 1	BBB&C Sur. A-36	N.P.W.	Strawn	5,100	5,270	35	Sub.
12.	Archer		Harris	Young 1	Sec. 2,431, TE&L	N.P.W.	Cisco	1,481	1,481	5	Sub.
13.	Archer	Griffin	Kadane	Griffin 1-J	Sec. 14, Denton CSL	Out-Ext.	Strawn	4,334	4,334	144	Sub-Seis.
14.	Archer		Perskey	Ray 9	Wm. Henry Sur. A-163	N.P.W.	Cisco	1,117	1,118	3	Sub.
15.	Archer	Vogtsberger	Republic	Sloop 1	Sec. 8. Blk. 1, H&TC	Out-Ext.	Strawn	4,727	4,727	112	Sub.
16.	Archer		Scholl	Andrews 1-B	Gholson Sur. A-733	DP	Caddo	4,574	4,710	55	Sub.
17.	Archer		Southern Petrol.	Wilson 1-D	Sec. 71, Blk. 1, ATNCL	N.P.W.	Strawn	3,933	4,413	307	Sub.
18.	Archer		Southern Pet. & Sohio	Wilson 1-E	W. Walker Sur. A-660	N.P.W.	Strawn	3,703	4,267	20	Sub.
19.	Archer	A.B.C.	Snowden	Calvin 2	R. Grooms Sur. A-155	Out-Ext.	Caddo	4,685	4,798	60	Sub.
20.	Archer		Stewart & Grisham	O'Donohoe 1-A	Sec. 104, ATNCL	N.F.W.	Strawn	3,773	5,163	16	Sub.
21.	Archer		Story	Abercrombie 1	Blk. 153, Harris S/D	N.P.W.	Cisco	1,204	1,236	26	Sub.
1.	Baylor		Ashland	Martin 1	Sec. 3,114, TE&L	N.F.W.	Miss.	5,420	5,763	63	Seis.
1.	Brown	Regular	English	Madison 1	J. Delgado	DP	Bend	2,251	3,400	99	Sub.
2.	Brown	Pecan Bayou	Milligan & White	Tolleson 1	R. Highsmith #75	N.F.W.	Marble Falls	1,478	1,618	5,500 MCF	Sub.
1.	Callahan	Cutbirth	Anzac Oil	Cutbirth 1	#204 B. Garcia	N.F.W.	Ellen.	3,939	3,939	43.75	Sur. & Sub.
2.	Callahan	Baum-Ellenburger	Fogelson & Inglewright	Baum-Swafford 1	#798 G. M. Vigal	DP	Ellen.	3,862	3,862	78	Sub.
3.	Callahan	Isenhour-Ellenburger	Producers Devel. Co.	Isenhour 1	Sec. 7, BOH	DP	Ellen.	3,980	3,980	22	Sub.
4.	Callahan	Runwalt	Runwalt	Howser 1	751 J. Dyson	N.F.W.	Bend	3,368	3,862	119	Sub.
5.	Callahan	Un-named	Starr	Taylor and Ramsey 1	Sec. 319, Blk. 5, SP RR	N.F.W.	Bend	3,145	4,079	3,000 MCF	Unknown
1.	Clay	Joy	Burns	Tally 1	J. H. Belcher S/D	Out-Ext.	Strawn	4,449	4,466	216	Sub.
2.	Clay	Joy	Burns	Tally 5	J. H. Belcher S/D	Out-Ext.	Strawn	4,432	4,576	107	Sub.
3.	Clay		Continental	Scott 1	Sec. 3,239, TE&L A-600	N.F.W.	Ellen.	6,485	6,515	58	Seis.
4.	Clay	N. Joy	Fain-McGaha	Amos & Andy 1-A	Lot 26, J. H. Belcher S/D	Out-NP	Strawn	3,765	3,812	240	Sub.
5.	Clay	Ross (Jolly)	Fain-McGaha	Ross 1-B	J. Wyont Sur. A-902	Out-Ext.	Strawn	4,816	4,838	357	Sub. & Seis.
6.	Clay	Ringgold	Gulf	Spring 19	Sec. 37, Blk. 4, H&TC	SP	Strawn	4,825	5,612	814	Sub.
7.	Clay	Mobley	Johnson	Mobley 1	T. Moorehead Sur. A-310	N.F.W.	Strawn	4,013	4,030	193	Sub. & Seis.
8.	Clay	Mobley	Johnson	Mobley 3	T. Moorehead Sur. A-310	DP	Strawn	4,588	4,608	163	Sub. & Seis.

9.	Clay	Bryant-Simpson	Phillips	Edwards 1	Redding Sur.	N.P.W.	Simpson	6,118	6,449	590	Sub. Seis. & Grav.
10.	Clay		Reeves-Ely	Burns 1	Lot 25, J. H. Belcher, S/D	N.P.W.	Strawn	4,945	6,152	65	Sub.
1.	Coleman	Bead Mountain	Anzac	Evans 1	Sec. 27, Blk. 1, GH&H	N.F.W.	Strawn	2,935	2,935	169	Sur. & Sub.
2.	Coleman	Kennedy	Ped-Og Syndicate	Kennedy 1	310 F. Owens	N.F.W.	Canyon	2,527	2,527	20	Unknown
1.	Cooke	Voth	Anco	Voth 2-B	N. Matson Sur. A-894	Out-Ext.	Strawn	1,116	1,164	5	Sub.
2.	Cooke		Benson	Bordovsky 2	A.C.C. Bailey Sur. A-44	Out-NP	Strawn	2,297	2,463	6	Sub.
3.	Cooke	N. Muenster	Dinsmore, et al.	Yosten 1	G.M. Casey Sur. A-198	Out-Ext.	Strawn	780	780	10	Sub.
4.	Cooke	Bulcher	Grant	Human 1	P. P. Anderson Sur. A-24	N.P.W.	Strawn	2,245	2,245	98	Sub.
5.	Cooke	Muenster	Hollandsworth	Cook 2	J. Lewis Sur. A-567	N.P.W.-Ext.	Strawn	1,010	1,010	8	Sub.
6.	Cooke		Hollandsworth	Fenley 2	M. Longham Sur. A-564	Out-NP	Strawn	1,029	1,031	2	Sub.
7.	Cooke		Hollandsworth	Gregory 1-B	G. Steel Sur. A-1,062	N.P.W.	Strawn	1,618	1,712	2,000 MCF	Sub.
8.	Cooke	Atcheson	Phillips	Atcheson 1	J. Davis Sur.	N.F.W.	Ellen.	1,963	2,064	646	Core Drill
1.	Denton		Anco	Forrester 1-B	J. B. Baroux Sur. A-45	Out-Ext.	Strawn	1,648	1,669	11	Sub.
2.	Denton		Anco	Forrester 1-C	W. Nelson Sur. A-963	N.P.W.	Strawn	1,613	1,625	33	Sub.
3.	Denton		Harvey	Waide 1	T. Carpenter Sur. A-271	N.P.W.	Strawn	1,650	1,678	26	Sub.
1.	Eastland	Un-named	Lone Star	Mitcham 1	Sec. 491 SP RR	N.F.W.	Bend	3,964	4,551	1,800 MCF	Sub.
1.	Fisher	Round Top	Hall	Terrell 1	Sec. 80, Blk. 1, H&TC	N.F.W.	Canyon	4,935	4,942	307	Sub. & Seis.
2.	Fisher	Royston	TP C&O	Young 1	3 W. E. Kaye	Ext.	Cisco	3,115	3,115	22	Seis. & Grav.
1.	Foard	Halsell	Stanolind	Halsell 1	J. Shearer Sur.	N.F.W.	Strawn	4,838	5,912	20	Seis.
1.	Grayson	Sherman	Stand. of Texas	Covey-Bates 1	J. B. McNair A-763	N.F.W.	Strawn	3,782	3,792	90	Seis.
1.	Haskell		Humphrey	Burnett 4	J. Campbell 58	N.P.W.	Canyon	2,776	2,778	63	Sub. & Seis.
2.	Haskell		McCarthy	Hendricks 1	A. Rodrigues	N.F.W.	Cisco	1,753	1,769	10	Sub.
1.	Jack		Ashland	Henderson 1	I. Hughson Sur. A-256	Out-NP	Strawn	3,275	3,276	24	Sub. & Seis.
2.	Jack	Bryson	Berry & Hill & Hill	Clayton 1	L. Knight Sur. A-324	DP	Miss.	5,120	5,158	1,134	Sub.
3.	Jack	Moore	Cox	Spearman 1	SP RR Sur. A-583	Out-Ext.	Bend	4,830	5,029	25	Sub.
4.	Jack	Lester	Johnson	Johnson 1	C. Vanderver Sur. A-867	Out-Ext.	Marble Falls	4,977	4,977	57	Sub. & Seis.
5.	Jack		Johnson	Wright 1	J. Robbins Sur. A-490	N.P.W.	Cisco	793	806	4	Sub.
6.	Jack		Lloyd	Eatherly 1	W. B. Stramer Sur. A-1,002	N.F.W.	Bend	4,897	5,512	34	Unknown
7.	Jack	Hoeffle	Warren	Cantrell 1	Sec. 2, SP RR A-2,206	N.P.W.	Caddo	4,746	4,746	758	Seis.
8.	Jack		Warren	Gillespie 1-C	J. B. McNeil Sur. A-1,796	Out-NP	Ellen.	5,520	5,520	20	Sub.
9.	Jack		Warren	Walden 1	I. Hughson Sur. A-256	DP	Caddo	4,424	5,138	3,500 MCF	Sub. & Seis.
1.	Jones	Sayles	Conder Pet.	Sayles 44	Sec. 3, Blk. 20, T&P	DP	Canyon	3,993	5,080	11	Sub.
2.	Jones	Un-named	Delhi Oil Corp.	Neumann 1	Sec. 52, Blk. 18, T&P	N.F.W.	Cisco	2,940	4,576	40	Sub.
3.	Jones	Hardy	Great Lakes	Hardwick 1	Sec. 11, Blk. 4, H&TC	Out-Ext.	Canyon	3,679	3,748	94	Sub.
4.	Jones	Un-named	Hansbro	Hunter 1	Sec. 27, Blk. 15, T&P	N.F.W.	Cisco	2,210	2,210	50	Sub.
5.	Jones	Un-named	Hunter	Shanks 1	192, R. Smith	N.F.W.	Cisco	2,397	2,397	149	Sub.
6.	Jones	Noodle	Roark-Hooker-Roark	Winters 5	Sec. 40, Blk. 18, T&P	DP	Canyon	3,877	5,405	120	Sub.
7.	Jones	Un-named	Texas	Herring 1	Sec. 21, DeWitt CSL 150	N.F.W.	Ellen.	5,402	5,402	82	Seis.
8.	Jones	Un-named	Ungren-Frazier	Bartlett 1	Sec. 43, Blk. 2, SP RR	N.F.W.	Cisco	3,242	3,242	564	Sub.
9.	Jones	Un-named	Wood	Connally 1-B	4 A. W. Hill	N.F.W.	Cisco	2,032	2,032	31	Sub.
1.	Montague		Bay	Watson Heirs 1	Lot 84, J. H. Belcher S/D	N.F.W.	Strawn	5,683	5,683	1,614	Seis.
2.	Montague	Magee	Continental	Bell 1	Wm. Yarbrough Sur. A-939	DP	Strawn	6,488	6,601	143	Seis.
3.	Montague	Lewis Stuart	Continental	Davidson 1	N. S. Ussery Sur.	SP	Caddo	6,215	6,556	776	Seis.
4.	Montague	Magee	Continental	Magee 1	C. A. Wright Sur.	N.F.W.	Strawn	6,038	6,040	159	Seis.
5.	Montague		Pace, et al.	Pitman 1	J. Ferguson Sur.	N.P.W.	Strawn	2,008	2,008	28	Sub.
6.	Montague		Texas	Benson 1	Sec. 1, Limestone CSL	N.F.W.	Strawn	6,244	6,468	1,192	Sub. & Seis.

TABLE 1—(*continued*)

Map Index	County	Field	Operator	Farm Well No.	Location	Class	Producing Formation	Depth of Producing Form. (Feet)	Total Depth	Daily Initial Prod. (Barrels)	Method of Exploration
1.	Palo Pinto	Misc.	Loyd	Dalton 1	2 Dalton Sur. A-1,555	N.F.W.	Strawn	1,190	1,222	2,500 MCF	Sub.
1.	Runnels	W. Ballinger	Southern Mins.	Northington 1	T. Pratt Sur.	N.F.W.	Bend	4,170	4,170	33	Sur.
1.	Shackelford	Un-named	Big West	Hendricks 12-A	Sec. 8, AB&M	N.F.W.	Ellen.	5,268	5,268	156	Sub.
2.	Shackelford	Corkwood Creek	Fogelson & Inglewright	Lones 1	Sec. 64, Blk. 11, T&P	N.F.W.	Strawn	3,078	4,336	132	Sub. & Surf.
3.	Shackelford	Misc.	Hedrick-Jones	Nail 3	Sec. 92, ETRR	N.F.W.	Cisco	1,356	1,409	15	Sub.
4.	Shackelford	Un-named	Hickok & Reynolds	Davis 1	Sec. 14, Blk. 12 T&P	N.F.W.	Ellen.	4,957	4,957	148	Sub.
5.	Shackelford	Ft. Griffen	Humble	Pitzer 1	Sec. 508, TE&L	N.F.W.	Miss.	4,595	4,666	63	Seis.
1.	Stephens	Compton	Caprito	Compton 1	Sec. 34, OAL	N.F.W.	Bend	3,431	3,441	127	Sub.
2.	Stephens	Peeks	Johnson	Peeks 1	Sec. 19, Blk. 7 T&P	N.F.W.	Strawn	2,352	2,352	45	Sub.
3.	Stephens	Harpersville	Manning	Mueller 1	Sec. 2,258, TE&L	N.F.W.	Bend	3,366	4,232	151	Seis.
4.	Stephens	Chaney	Prairie	Chaney 1	Sec. 2,953, TE&L	N.F.W.	Bend	3,365	3,365	1,200	Sub.
5.	Stephens	Star-Tip	Star Oil	Tipton 1	N. Williams Sur.	N.F.W.	Miss.	4,534	4,713	134	Seis.
1.	Taylor	Patterson	Geo-Chemical Surveys	Patterson 1	Grimes CSL 148	N.F.W.	Wolfcamp	2,240	2,240	111	Geo-Chemical
2.	Taylor	N. Ingram	Harvey & Maguire	Ferrell 1	Grimes CSL 147	N.F.W.	Wolfcamp	2,469	2,469	102	Seis.
3.	Taylor	Tipton	Roberts	Tipton 4	Sec. 20, Blk. 18, T&P	DP	Canyon	4,241	4,241	174	Sub.
4.	Taylor	W. Trent	Stewart	Miller 1	Sec. 50, Blk. 19 T&P	N.F.W.	Cisco	2,578	2,578	40	Sub.
1.	Throckmorton	Parrott	Goodstein & Gordon	Parrott 3	Sec. 955, TE&L	S.P.W.	Canyon	2,612	4,052	150	Sub. & Seis.
2.	Throckmorton		Grisham	Key 1	Sec. 1,194 TE&L	N.P.W.	Cisco	751	768	8,000 MCF	Sub.
3.	Throckmorton		Harrell	Harrell 1	J. McCorquodle Sur. A-350	N.P.W.	Cisco	708	708	30	Sub.
4.	Throckmorton	Stubblefield	Humble	Graham 4	Sec. 993, TE&L	DP	Miss.	4,580	4,625	1,860	Sub.
5.	Throckmorton	Stubblefield	Humble	Stubblefield 4	Sec. 991, TE&L	S.P.W.	Penn. Cgl.	4,429	4,685	80	Sub.
6.	Throckmorton		Manning	Brown 1-K	BBB&C Sur. Sec. 261	N.F.W.	Caddo	4,461	5,312	610	Sies.
7.	Throckmorton		Manning	Graham-Manning 1	Sec. 994, TE&L	N.P.W.	Caddo	3,911	4,010	51	Seis.
8.	Throckmorton	Stubblefield	Manning	Letwin-Stubblefield 1	Sec. 991, TE&L	DP	Miss.	4,625	4,655	103	Seis.
9.	Throckmorton		Manning	Marshall 1	Sec. 949, TE&L	Out-Ext.	Caddo	3,953	4,022	467	Seis.
10.	Throckmorton	Record	Manning	Record 1	Sec. 1,609, TE&L	N.F.W.	Miss.	4,693	4,693	360	Seis.
11.	Throckmorton	Keeter	Mayflower	Keeter 1	Sec. 3,033, TE&L	N.F.W.	Miss.	4,878	5,134	192	Sub.
12.	Throckmorton	Mudge-Graham	Mudge	Graham 1	Sec. 2,201, TE&L	N.P.W.	Caddo	3,885	4,702	108	Seis.
13.	Throckmorton		Snowden	Bailes, et al. 1	Sec. 296, BBB&C	N.F.W.	Caddo	4,245	4,245	934	Surf. & Seis.
14.	Throckmorton	Howsley	Snowden	Howsley 1	Sec. 300 BBB&C	N.F.W.	Miss.	4,709	4,719	380	Seis.
15.	Throckmorton	Howsley	Snowden	Howsley 2	Sec. 300, BBB&C	S.P.	Caddo	4,206	4,719	893	Seis.
16.	Throckmorton	Elm Creek	Sztykgold	King "B" 1	Sec. 3, AB&M	N.F.W.	Caddo	4,998	5,145	856	Seis.
17.	Throckmorton	Woodson (Black Creek)	Woodley	Odell 2	Sec. 696, TE&L	D.P.	Miss.	4,567	4,660	760	Seis.
1.	Wichita		Consolidated	Daves 1-A	Lot 14, Denton CSL	N.F.W.	Strawn	5,348	5,525	70	Sub. & Seis.
2.	Wichita	Kempner	Goldsmith	Kempner 1	Blk. 55, KWVFL	D.P.	Strawn	3,916	4,728	608	Sub.
3.	Wichita	West	Hale	Allison 1	J. Nicholson Sur. A-375	Out-Ext.	Strawn	4,245	4,245	82	Sub.
4.	Wichita	K.M.A.	Pois & Schultz	Waggoner 1	Sec. 35, Blk. 7, H&TC	Out-Ext.	Cisco	1,610	1,918	46	Sub.
5.	Wichita	Electra	Wood	Gillis 4	Sec. 2, AB&M Sur. A-339	Out-Ext.	Cisco	1,400	1,425	37	Sub.

1.	Wilbarger	Fargo	Humble	McCaleb 6	Sec. 34, Blk. 15, H&TC	DP	Ellen	6,256	6,345	2,405	Sub. & Seis.
2.	Wilbarger	Electra	Kouri	Waggoner 1	Sec. 7, Blk. 13, H&TC	Out-Ext.	Cisco	2,135	2,135	27	Sub.
1.	Wise	Chico	Cities Service	Manning 1	J. Tarleton Sur.	N.F.W.	L. Penn.	5,235	7,052	164	Seis.
1.	Young	Graham Vic	Anzac	Graham 2-D	Sec. 3,410, TE&L	Out-NP	Cisco	507	507	3,000 MCF	Surf. & Sub.
2.	Young		Bockhoff	Jester 1	Blk. 10, Holman & Crawford S/D	Out-NP	Cisco	1,227	1,227	8	Unknown
3.	Young		Burns	Campbell 1-C	Sec. 1,370, TE&L	Out-NP	Caddo	4,476	4,605	156	Sub.
4.	Young	Campbell	Cato	Hamilton 1-A	Sec. 1,393, TE&L	DP	Caddo	4,450	4,590	109	Sub.
5.	Young		Davis Invest.	Pool 1	Sec. 622, TE&L	N.P.W.	Caddo	3,973	5,020	25	Core Drill
6.	Young	N. Eliasville	King	Elkins 1	J. Fields Sur.	Out-Ext.	Caddo	3,455	3,455	1,200,000 CF gas	Surf. & Sub.
7.	Young	N. Eliasville	King	Stimpson 1	H. M. Jones Sur.	Out-Ext.	Caddo	3,360	3,360	33,000,000 CF gas	Surf. & Sub.
8.	Young		Lipscomb	Foster 1	Sec. 342 TE&L	N.P.W.	Miss.	4,691	4,691	156	Seis.
9.	Young	Slater	Lloyd, et al.	Slater 2	Sec. 463, TE&L	DP	Miss.	4,732	4,768	288	Sub.
10.	Young	Slater	Nu-Enamel, et al.	Slater 1	Sec. 463, TE&L	DP	L. Caddo	4,118	4,787	168	Sub.
11.	Young	Oil City	Nunnellee	Lynn 1	Robt. Alcorn Sur. A-1,767	DP	Strawn	2,625	2,673	624	Non-Tech.
12.	Young	Oil City	Nunnellee	Pugh 1	Robt. Alcorn Sur. A-1,767	DP	Marble Falls	3,895	4,057	455	Trend.
13.	Young	Brundidge	Panhandle	Brundidge 2	H. M. Jones Sur.	DP	Miss.	4,454	4,492	149	Surf. & Sub.
14.	Young	Kerlyn-Edwards	Snowden	Howard 1	Sec. 1,480, TE&L	SP	Caddo	4,468	5,200	140	Seis.
15.	Young		Star	Evans 2	Sec. 1,201, TE&L	Out-Ext.	Caddo	3,316	4,470	13,200,000 CF gas	Sub.
16.	Young	Bryson	Street Invest.	Shanafelt 2	AB&M Sur.	DP	Marble Falls	4,311	4,351	1,750,000 CF gas	Unknown
17.	Young		Warren	Bellamy 1-D	Sec. 718, TE&L	N.P.W.	Caddo	4,190	4,885	15	Seis.
18.	Young	Holbert-Caddo	Warren	Dowda 1	Sec. 721, TE&L	Out-NP	Caddo	3,836	3,836	139	Seis.
19.	Young	Holbert	Warren	Griffin 2-B	Sec. 727, TE&L	Out-NP	Strawn	2,593	2,593	151	Seis.
20.	Young	Martin	Warren	Martin 1	M. Dewitt Sur. A-1,412	N.P.W.	Marble Falls	4,340	4,842	12,900,000 CF gas	Surf. Sub. & Seis.

The exploratory methods credited with these discoveries are as follows: 1 surface geology, 74 subsurface geology, 30 seismograph, 1 geochemical, 2 core drill, and 26 by a combination of two or more methods. Though the gravity meter and magnetometer were credited with no independent discoveries, both were used successfully in combined methods. The same is true for surface geology in several instances. Of the combined methods, detailed seismic shooting guided by subsurface geology was most effective, and probably was actually responsible for many of the discoveries credited to one method alone.

The number and types of field exploratory methods, exclusive of surface geology, active in this district are indicated by the following table.

Date	*Seis.*	*Gravity*	*Map*	*Core Drill*	*Elect.*	*Soil Analysis*
1947						
Jan. 1	30	9	1	7	0	0
July 1	37	10	2	6	1	0
Dec. 30	50	16	0	8	0	0

This represents an over-all increase of nearly 100 per cent in the number of field exploration crews active in this district during 1947 over those in 1946. The number of geologists employed in the district also increased an estimated 20 per cent over last year.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 997-1008, 2 FIGS., 1 TABLE

DEVELOPMENTS IN SOUTH TEXAS IN 1947[1]

BRUCE SCRAFFORD[2]
San Antonio, Texas

ABSTRACT

Development in the South Texas district during 1947 showed a 26 per cent increase over the previous year. In all, 2,386 tests, 1,758 wells in proved areas and 528 wildcat wells, were drilled and resulted in 1,541 successful completions. The exploratory development resulted in the discovery of 63 new producing areas, the Bloomington field of Victoria County and the Cam field of Duval County being the outstanding discoveries of the year. Wells drilled in productive areas uncovered 151 new producing zones, the Frio-Vicksburg trend accounting for 112. The new producing zones in old fields are probably of greater reserve importance than the new fields discovered in 1947. At the close of 1947, 15,775 oil wells in South Texas had produced 154,179,726 barrels of oil, 11 per cent more than that of the previous year, and gas transmission lines had marketed 140,227,866 MCF of gas well gas and 5,980,000 MCF of casinghead gas. Seventy-six per cent of the oil produced in South Texas comes from fields of the Frio-Vicksburg trend.

INTRODUCTION

The South Texas district is the area referred to by the Railroad Commission of Texas, Oil and Gas Division, as Districts 1, 2, and 4 with the omission of Mason County on the northwest and the addition of Burleson, Lee, and Fayette counties on the northeast. The area which embraces 61 counties in all is shown on Figure 1.

For convenience, because of the large size of the South Texas district, development in this area has been subdivided into stratigraphic divisions based on the geologic age of the various production trends. These subdivisions, previously suggested by Kidd, are as follows:[3] (1) the Ordovician and Pennsylvanian of the Edwards Plateau: (2) the Cretaceous of the Balcones Fault zone; (3) the Wilcox, Carrizo, Queen City, and Sparta of the lower Eocene trend; (4) the Yegua and Jackson of the upper Eocene; (5) the Frio-Vicksburg group of the basal Oligocene; and (6) the upper Oligocene and lower Miocene of the coastal area, including the *Marginulina*-Frio, Catahoula, and Oakville.

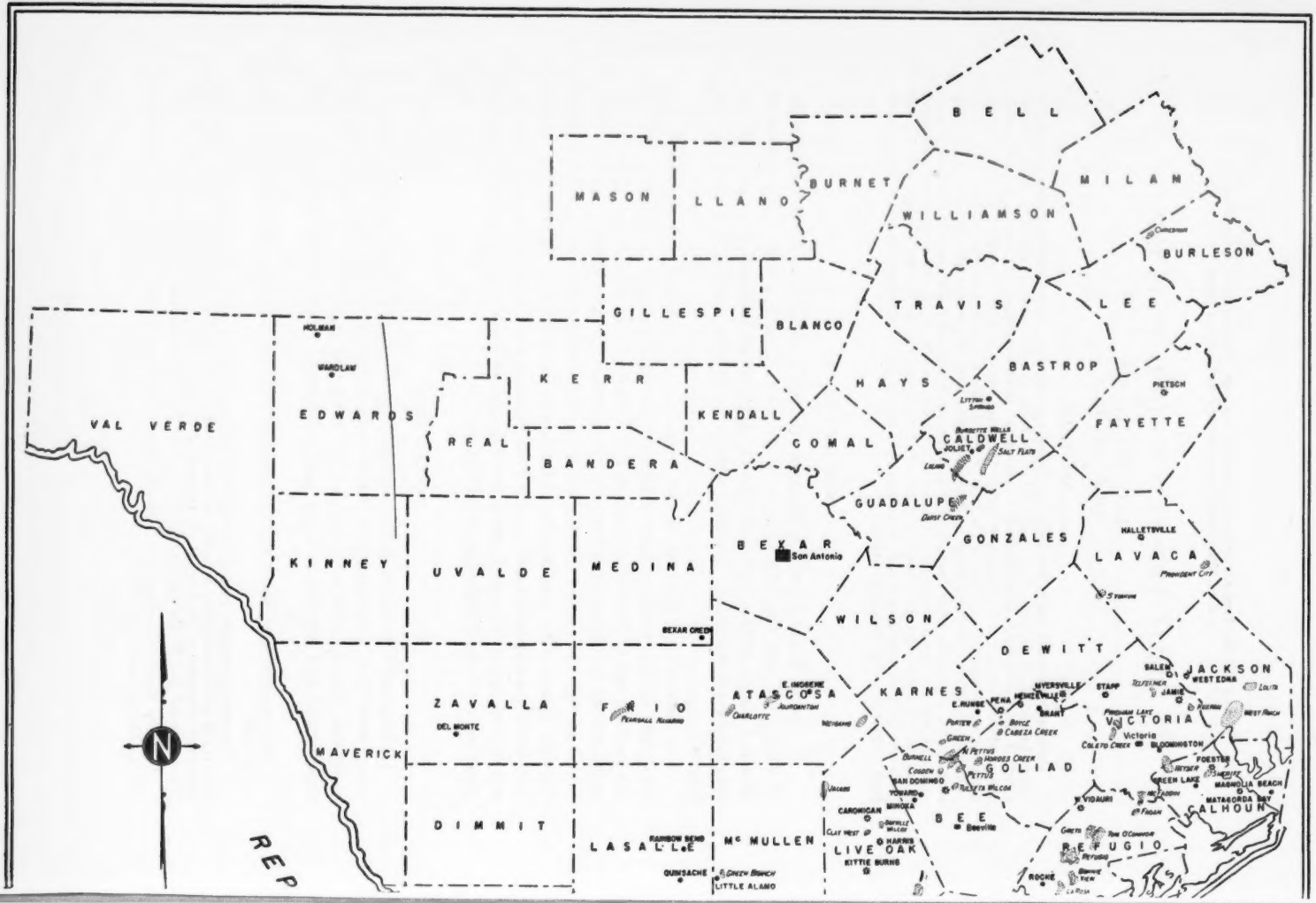
DEVELOPMENT

Drilling activity in the South Texas district in 1947 showed a 26 per cent increase over that of the previous year in both exploratory and field-development categories. In all, 2,386 tests, 1,758 wells in proved areas and 528 wildcat wells, were drilled and resulted in 1,541 producing wells. Seventy-four field wells and

[1] Manuscript received, March 19, 1948. Presented by title before the Association at Denver, April 26–29, 1948.

[2] Consulting geologist, 1610 Alamo National Building. Assistance of the following in checking the accuracy of development data is hereby acknowledged: W. W. Hammond and others of the Magnolia Petroleum Company; C. H. Row, H. M. Hansell, L. C. Smith, and John A. Young, Jr. of the Sun Oil Company; and Jack K. Baumel and Sol Smith of the Railroad Commission of Texas.

[3] Gentry Kidd, "Developments in South Texas, 1938–1939," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 23, No. 7 (June, 1939), pp. 860–70.


BELL
MASON
LLANO
BURNET
WILLIAMSON
MILAM
BURLESON
GILLESPIE
BLANCO
TRAVIS
LEE
KERR
HAYS
BASTROP
VAL VERDE
EDWARDS
KENDALL
COMAL
FAYETTE
REAL
BANDERA
CALDWELL
GUADALUPE
BEXAR
San Antonio
GONZALES
LAVACA
KINNEY
UVALDE
MEDINA
WILSON
DEWITT
JACKSON
ZAVALLA
ATASCOSA
KARNES
VICTORIA
FRIO
MAVERICK
GOLIAD
DIMMIT
BEE
REFUGIO
LASALLE
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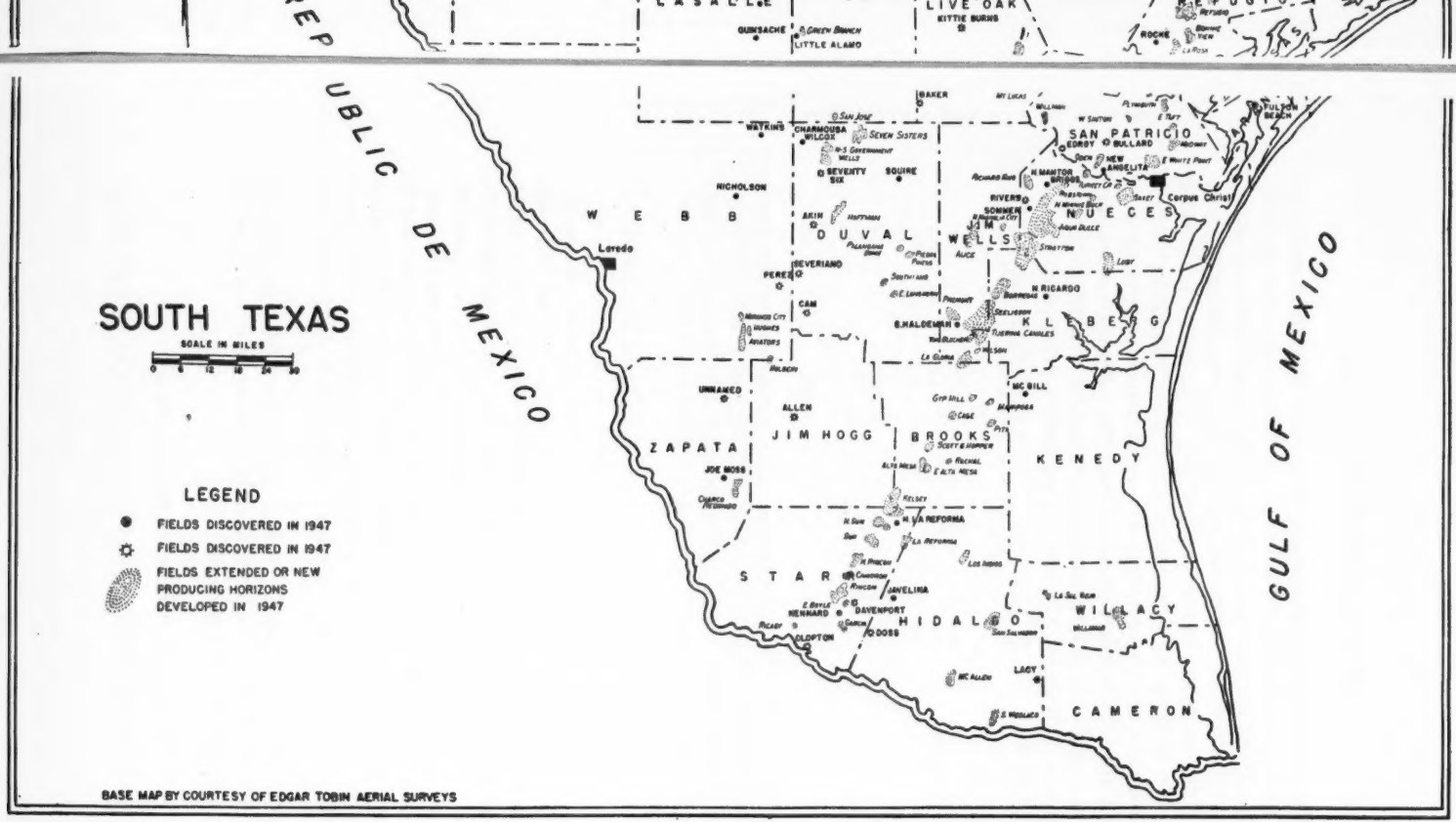
SOUTH TEXAS
SCALE IN MILES
0 12 18 24 30
LEGEND
FIELDS DISCOVERED IN 1947
FIELDS DISCOVERED IN 1947
FIELDS EXTENDED OR NEW PRODUCING HORIZONS DEVELOPED IN 1947
REPUBLIC DE MEXICO
GULF OF MEXICO
WEBB
DUVAL
JIM WELLS
NUECES
SAN PATRICIO
ZAPATA
JIM HOGG
BROOKS
KENEDY
STARR
HIDALGO
WILLACY
CAMERON
KLEBERG
Laredo
Corpus Christi
BASE MAP BY COURTESY OF EDGAR TOBIN AERIAL SURVEYS

FIG. 1

two of the new field discovery wells were dually completed. The rate of successful completions in proved areas remained, as in 1946, at 81 per cent, with the addition of 1,281 oil wells and 194 gas or gas-condensate wells to production schedules.

The 528 wildcat wells drilled during the year opened 63 new producing areas, giving a successful completion rate of 12.3 per cent. A survey of prospecting methods utilized in locating the successful wildcats shows subsurface geology as the basis of discovery of 31, geophysical surveys accounted for 27 and 5 were found by a combination of subsurface and geophysics. The following is a summary tabulation of the exploratory development and the results obtained in the six South Texas geological provinces. The totals of productive wells reflect the two dually completed wells.

Geologic Province	*Discovery Wells*		*Abandoned Wells*	*Total*
	Gas	*Oil*		
Ordovician-Pennsylvanian	—	—	14	14
Cretaceous	—	6	99	105
Wilcox-Sparta	10	8	80	98
Yegua-Jackson	11	2	156	169
Frio-Vicksburg	11	14	109	134
Oligocene-Miocene	2	1	5	8
Total	34	31	463	528

Two of the wells, H. L. Hunt and George Graham's Spencer-Crane No. 1 which discovered the Fulton Beach field of Aransas County and the Roger Lacy's No. 1, discovery well of the Lacy field of Cameron and Hidalgo counties, were dually completed as oil and gas producers. Four tests, drilled in the Cretaceous trend, encountered basement rock.

Without investigation beyond these statistics regarding new discoveries, one might be justified in assuming an optimistic viewpoint regarding the rate of oil depletion and replacement of reserves. Thirty-seven of the 1947 field discoveries were at the close of the year one-well fields. In all, 165 oil wells, 50 gas wells, and 47 dry tests were drilled in the vicinity of the discoveries. Outstanding among the new producing areas from a reserve standpoint, as based on present development, is the Bloomington field of Victoria County, discovered by the Amerada Petroleum Company's Alexander Unit No. 1. Fifty-three oil producers were completed at Bloomington during the last 7 months of the year. The Cam field of Duval County, discovered by George W. Graham's Rosa Benavides No. 1, is one of the more prolific discoveries found in the Yegua-Jackson trend in recent years. Twenty-three oil producers had been accredited to the Cam field before the close of the year.

The location of the discoveries for 1947 as well as the fields extended and fields in which new producing formations have been encountered are shown in Figure 1. Table I shows the discovery wells.

NEW PRODUCING ZONES IN PROVED AREAS

Probably more important than the new discoveries from an ultimate reserve

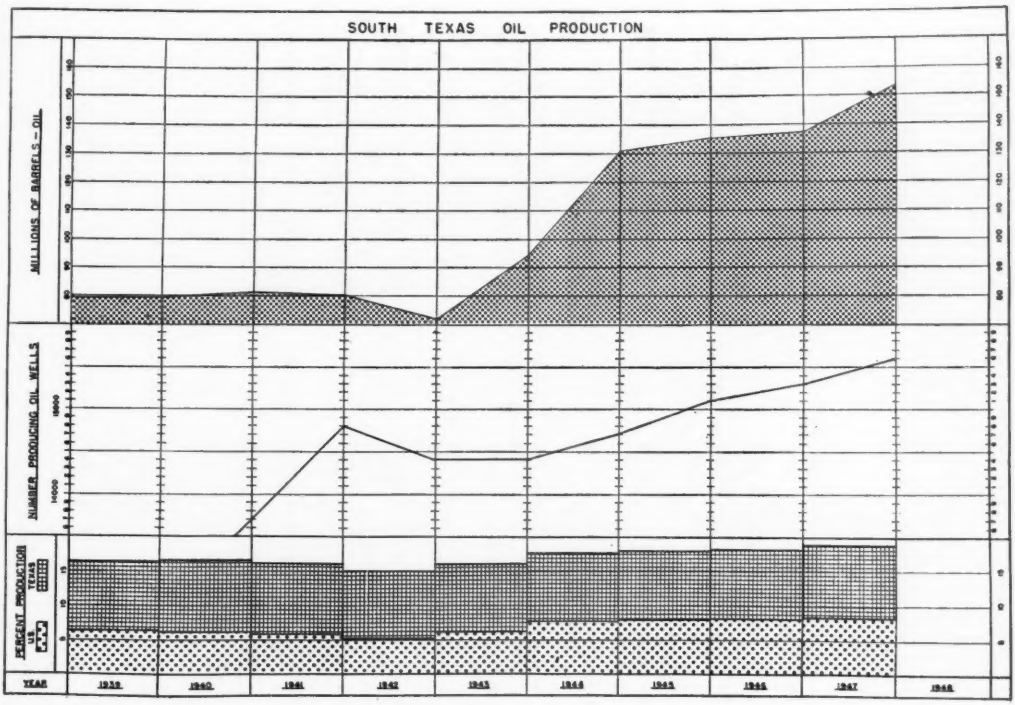

FIG. 2

standpoint are the 151 new producing zones uncovered in proved areas. Ninety-seven of new productive zones were oil-bearing and the remainder gas or gas-condensate. The fields of the multiple-reservoir Frio-Vicksburg trend accounted for 112 of the 151 new producing zones. Thirty-eight of 48 field wells deepened were successfully completed, several encountering oil in producing zones not previously proved for production.

PRODUCTION

Figure 2 shows the trend of oil production in the South Texas district, the number of producing oil wells at the close of each year and percentage comparisons with the total production of the United States and Texas for the period 1939–1947. During 1947, 154,179,726 barrels of oil were produced from the fields of South Texas, an increase of 11 per cent over the production for the previous 12-month period. Two-thirds of the 15,775 oil wells on the Railroad commission of Texas proration schedule in December were flowing, and the remainder were producing by some means of artificial lift. The liquids from 368 gas-condensate wells provided an additional 1,499,368 barrels to the total production of the area.

TABLE I

SOUTH TEXAS FIELDS DISCOVERED IN 1947

County and Field	*Type*	*Completion Date*	*Discovery Well*	*Survey*	*Total Depth (Feet)*	*Depth of Prod. Form. (Feet)*	*Initial Production and Choke*	*Producing Trend*
ARANSAS								
Fulton Beach	Oil-Gas (Dual)	8- 6-47	H. L. Hunt & Geo. Graham, Spencer-Crane 1	C. O. D. Gilliland	8,370	7,058–65 7,126–36	185 BOPD; 9/64″ ck.+ 5,000 MCFG; open flow	Frio-Vicksburg
ATASCOS								
East Imogene	Oil	10- 5-47	Humble Oil & Refg. Co., Gordon-Dinsmore 1	B.B.B. & C. RR 1,060 A-115	8,124	8,093–8,104	3 BOPD; 3/16″ ck.	Cretaceous
BEE								
Minoak	Oil	7-31-47	Rowan & Hope, Rio Oil Corp. 1	J. R. Carney A-1,209	7,868	7,530–50	65 BOPD; 1/4″ ck.	Wilcox-Sparta
San Domingo	Gas	9-20-47	J. R. Dougherty, I. M. Nine 1	Oscar Farris 161	7,853	7,790–7,820	2,600 MCFG+17 Bbl. Dist.; open flow	Wilcox-Sparta
Yoward	Oil	4-14-47	Gasoline Prod. Corp. & Sunray Oil Corp., H. E. Yoward 1	C. B. Shain A-295	8,550	7,483–93	165 BOPD; 9/64″ ck.	Wilcox-Sparta
CALDWELL								
Joliet	Oil	6- 4-47	W. Killam, A. J. Rodenberg 2	Guadalupe College	2,174	2,118–74	63 BOPD; 3/8″ ck.	Cretaceous
CALHOUN								
Foester	Gas	8- 9-47	Quintana Pet. Corp., L. J. Foester 1	V. Benavides	10,064	7,920–41	42,000 MCFG; open flow	Frio-Vicksburg
Green Lake	Oil	7- 1-47	Ryan Consolidated, A. L. Wagner 1	M. Lopez	6,097	5,980–6,008	33 BOPD; 1/8″ ck.	Frio-Vicksburg
Magnolia Beach	Gas-Dist.	9-19-47	C. H. McSpadden, M. R. Goggans 1	B. Morales 1, A-28	6,220	5,760–70	63,800 MCFG+133 Bbl. Dist.; 1/4″ ck.	Miocene-Oligocene
Matagorda Bay	Oil	2-19-47	The Texas Co., State of Texas 1	State 106	11,530	4,970–78	192 BOPD; 12/64″ ck.	Miocene-Oligocene
DE WITT								
Meyersville	Gas-Dist.	1-31-47	Continental Oil Co., F. Ruschaupt 1	Patrick Dowlearn	9,194	8,576–89	1,810 MCFG+40 Bbl. Dist.; 1/4″ ck.	Wilcox-Sparta
Pena	Gas	10-21-47	Sunray Oil Corp., Lazo Pena 1	Antonio Lazo A-653	7,854	7,512–20	6,200 MCFG; open flow	Wilcox-Sparta

DUVAL								
Akin	Gas	5- 8-47	Rowden & Rowden, J. W. Akin 2	G.B. & C.N.G. 186, A-2,000	2,458	2,444–47	8,500 MCFG; open flow	Yegua-Jackson
Cam	Gas	1-16-47	G. W. Graham, Rosa Benavides 1	M. Arispe Grt 75	3,336	3,319–25	16,500 MCFG; open flow	Yegua-Jackson
Charamousca-Wilcox	Gas	9-17-47	Magnolia Pet. Co., Drought 1-A	Juan L. Saenz 154, A-1,320	8,504	6,454–65	2,310 MCFG+16 Bbl. Dist.; 5/16″ ck.	Wilcox-Sparta
Seventy-Six	Gas	4- 4-47	Magnolia Pet. Co., D.C.R.C.-State 1	G. Garza Sec. 76	2,341	1,323–35	4,100 MCFG; open flow	Yegua-Jackson
Severiano	Gas	6-26-47	R. T. McDermott, Casper Guerra 1	W. Meyer 146	2,596	2,540–45	5,250 MCFG; open flow	Yegua-Jackson
Squire	Oil	6-14-47	Santa Clara Oil & J. F. Camp, Welder Heirs 1-C	J. Poitevent 22	3,277	3,274–77	105 BPOD; 10/64″ ck	Yegua-Jackson
EDWARDS								
Holman	Oil	1-27-47	J. O. Rogers Oil Co., J. S. Holman 1	C.C.S.D. & R.G.N.G. 24	1,010	548–80	2 BOPD; pump	Cretaceous
Wardlaw	Oil	9-24-47	Babbs & Dillard, L. J. Wardlaw 1	C.G. & S.F., A-2102	248	230–48	25 BOPD; pump	Cretaceous
FAYETTE								
Pietsch	Gas	1-18-47	Standard of Kansas, A. Pietsch 1	J. R. Phillips, A-83	6,918	6,536–39	2,960 MCFG; 1/4″ ck	Wilcox-Sparta
GOLIAD								
Brandt	Oil	8-27-47	Sunray Oil Corp., Geo. H. Brandt 1	T. Hancock A-142	8,513	7,713–18	168 BOPD; 9/64″ ck	Wilcox-Sparta
Heinzeville	Gas-Dist.	8- 9-47	Dan Auld & Hawkins, Heinrich 1	Cyrus Donnelly A-116	7,775	7,560–66	3,200 MCFG+108 Bbl Dist; 1/4″ ck	Wilcox-Sparta
HIDALGO								
Doss	Gas	6- 2-47	The Texas Co., J. M. Doss 1	K. Zamora Por. 41 A-77	8,922	3,832–40	4,175 MCFG; open flow	Frio-Vicksburg
Javelina	Oil	12- 3-47	Continental Oil Co., Bentsen 1	Los Guajes, A-83	9,919	5,408–21	225 BOPD; 3/16″ ck	Frio-Vicksburg
Lacy	Gas-Oil (Dual)	12-29-47	Roger Lacy, Fee 1	N. Capisallo Dist. Sec. 22	10,713	7,455–65 7,983–88	9,600 MCFG 80 BOPD; jetting	Frio-Vicksburg
JACKSON								
West Edna	Gas	7-21-47	The Texas Co., S. G. Drushel et al. 1	I. & G.N. A-205	2,580	2,560–65	8,000 MCFG; open flow	Miocene-Oligocene
JIM HOGG								
Allen	Gas	5-14-47	Cam Corp., John Allen 1	H & G.N. 29, A-187	3,545	2,932–37	1,100 MCFG; shut in	Yegua-Jackson
JIM WELLS								
S. Haldeman	Oil	2-17-47	Magnolia Pet. Co. David Clarke 1	Haldeman S/D, Sec. 62	6,506	4,502–10	98 BOPD; 1/8″ ck	Frio-Vicksburg
KARNES								
East Runge	Oil	4-23-47	W. E. Kinnear et al., Dittmer 1	B. & B. 1, A-344	8,180	6,764–69	48 BOPD; 5/32″ ck	Wilcox-Sparta

TABLE I—(*continued*)

County and Field	*Type*	*Completion Date*	*Discovery Well*	*Survey*	*Total Depth (Feet)*	*Depth of Prod. Form. (Feet)*	*Initial Production and Choke*	*Producing Trend*
KENEDY								
McGill	Oil	2- 7-47	Atlantic Refg. Co., McGill Bros. 1	Santa Rosa de Arriba	9,905	7,676–80	47 BOPD; 9/64" ck	Frio-Vicksburg
KLEBERG								
N. Ricardo	Oil	7-24-47	Stanolind Oil & Gas Co., J. O. Johnson 2	Rincon de Santa Gertrudis	9,798	6,040–46	74 BOPD; 3/16" ck.	Frio-Vicksburg
LA SALLE								
Quinsache	Oil	5- 8-47	Newman Bros. & Skinner & Eddy, South Texas Syndicate 1-C	H. & G.N. 76	6,639	3,638–58	77 BOPD: pump	Wilcox-Sparta
Rainbow Bend	Oil	10-12-47	Newman Bros. & Skinner & Eddy, South Texas Syndicate 1-D	G. W. von Roeder 60	5,253	5,247–53	25 BOPD; 7/64" ck	Wilcox-Sparta
LAVACA								
Halletsville	Gas	7-15-47	Forest Oil Co., H. C. Obelgoner 1	James Campbell 2, A 6	9,003	7,511–16	4,000 MCFG- open flow	Wilcox-Sparta
LIVE OAK								
Baker	Gas	11-29-47	W. E. Rowe, E. M. Baker 1	Seale & Morris 7, A-875	3,510	2,002–25	4,000 MCFG; open flow	Yegua-Jackson
Caronican	Gas	6-16-47	Henshaw Bros. & E. A. Smith, Sippel 1	Michael Caronican, A-135	2,811	1,860–64	1,300 MCFG; shut in	Yegua-Jackson
Harris	Gas-Dist.	5-12-47	Stanolind Oil & Gas Co., Pearl Harris 1	Francisco Leal 54	10,020	7,370–80	3,654 MCFG+102 Bbl Dist.; 20/64" ck.	Wilcox-Sparta
Kittie Burns	Gas	6-19-47	Continental Oil Co., Kittie W. Burns 1	G. L. Hass 59, A-223	10,338	10,170–90	4,700 MCFG; open flow	Wilcox-Sparta
MCMULLEN								
Little Alamo	Oil	6-11-47	Newman Bros. & Skinner & Eddy, South Texas Syndicate 1-B	E. M. Beal 28, A-589	2,285	2,285–93	48 BOPD; pumpe	Wilcox-Sparta
MEDINA								
Bexar Creek	Oil	5- 1-47	Joh F. Camp & Sons, J. F. Camp 1	J. B. Zerr 48	2,257	2,240–50	5 BOPD; pump	Cretaceous
NUECES								
Mantor-Briggs	Oil	5-21-47	Renwar Oil Corp., Mantor-Briggs 1	Casa Blanca Grt	6,687	6,016–21	133 BOPD; 5/32" ck.	Frio-Vicksburg
Rivers	Gas	4-18-47	Pan American Prod. Co. & Jack Little Tr., Rivers 1	Richard King Frm Lot 26	6,316	5,528–39	7,800 MCFG; open flow	Frio-Vicksburg
Sommer	Oil	4-23-47	Mid-Continent, J. Sommer 1	Benton Pastures S/D	7,008	5,982–88	122 BOPD; 3/16" ck.	Frio-Vicksburg

REFUGIO								
Roche	Oil	3- 9-47	Hewitt & Dougherty, Roche 1-A	D. J. Mitchell A-215	6,818	6,814–18	155 BOPD; 1/8″ ck.	Frio-Vicksburg
W. Vidauri	Gas	11-28-47	P. R. Rutherford et al., J. W. Welder Heirs 1	Anna Jackson A-363	6,235	4,869–76	23,500 MCFG; open flow	Frio-Vicksburg
SAN PATRICIO								
Bullard	Gas	10-18-47	A. O. Morgan, E. H. Lane 1	Coleman S/D	7,507	6,660–75	16,500 MCFG; open flow	Frio-Vicksburg
Edroy	Gas	6-23-47	Southern Minerals, McGloin 1	A. B. & M., A-351	6,340	5,955–61	330,000 MCFG; open flow	Frio-Vicksburg
New Angelita	Oil	12-27-47	Continental Oil Co., Welder Hrs. 1-A	Tares & Villarreal A-32	7,601	5,976–98	129 BOPD; 1/4″ ck.	Frio-Vicksburg
STARR								
Clopton	Gas	8- 2-47	Osborn & Mid-Continent Oil Co., J. Clopton 1	Porcion 86	6,257	5,660–5,700	200 MCFG; open flow	Yegua-Jackson
Davenport	Gas	3-10-47	D. Davenport, Fee 1	Survey 974	5,501	4,098–4,112	2,235 MCFG; open flow	Frio-Vicksburg
Kennard	Oil	2-25-47	Coastal Oil Co., Geo. Coates 1	Porcion 93	4,319	3,870–82	38 BOPD; pump	Frio-Vicksburg
N. La Reforma	Oil	9- 4-47	Jay Simmons, First Nat'l Bank of Mission 1	San Jose Grt. A-575	7,500	6,112–17	130 BOPD; pump	Frio-Vicksburg
VICTORIA								
Bloomington	Oil	5- 2-47	Amerada Pet. Co., Alexander Unit 1	Francisco Perez, A-93	6,921	4,904–09	155 BOPD; 5/32″ ck.	Frio-Vicksburg
Jamie	Gas	12- 9-47	Rowan & Hope, S. Ragsdale 6	V. Garcia A-45	5,340	5,102–08	57,000 MCFG; shut in	Frio-Vicksburg
Salem	Gas	3-15-47	The Texas Co., G. E. Scott 1	W. Minter	4,532	4,110–20	18,000 MCFG; open flow	Frio-Vicksburg
Stapp	Gas	6- 2-47	Amerada Pet. Co., E. Mueller 1	E. Stapp, A-111	9,916	2,872–83	5,600 MCFG; open flow	Wilcox-Sparta
WEBB								
Nicholson	Oil	10-18-47	Humble Oil & Refg. Co., W. R. Nicholson 1	B. S. & F. 985	5,816	5,574–77	20 BOPD; 3/16″ ck.	Wilcox-Sparta
Perez	Gas	4-20-47	Hickok & Reynolds, Perez 1	J. Poitevent 459	2,631	1,265–95	4,000 MCFG; open flow	Yegua-Jackson
Watkins	Oil	5-16-47	Massingill & 56 Pet. Co., Parr 2-A	San Casimiro Blk. 20½	891	878–91	28 BOPD; pump	Yegua-Jackson
ZAPATA								
Joe Moss	Gas	6- 6-47	Joe Moss et al., Vela et al. 3	El Gruello Blk. 28	1,155	574–80	No gauge; shut in	Yegua-Jackson
Unnamed	Gas	10-30-47	Rodney DeLange, Cuellar Hrs. 1	Survey 246	1,254	1,037–45	3,000 MCFG; shut in	Yegua-Jackson
ZAVALA								
Del Monte	Oil	2- 2-47	The Texas Co., Cross S Ranch 1	Francisco Pereyra	3,334	3,303–34	73 BOPD; 3/16″ ck.	Cretaceous

The 1,110 gas wells in South Texas produced 539,635,158 MCF, an increase of 29,000,000 MCF over that produced in 1946. Transmission lines marketed 140,227,866 MCF of gas well gas, a 16 per cent gain on gas sold during the previous year. A large percentage of the gas not marked was cycled gas returned to the formation.

About 15 per cent of the producing oil wells in South Texas were at the close of the year being serviced for casinghead gas. At least six additional extraction and compression plants are scheduled for completion during the coming year and a market increase in the efficiency of the casinghead-gas operation should be noted. Of the 115 billion cubic feet of casinghead gas processed, only 5.98 billion was being sold to transmission limes. The account of residue gas marketed should be increased considerably during the coming year as both oil operators and gas-transmission-line operators are becoming more aware of the value of this by-product of oil production.

ORDOVICIAN-PENNSYLVANIAN

There is at present no commercial production from reservoirs of pre-Cretaceous age in the South Texas district. Fourteen exploratory wells were drilled in the Edwards Plateau area, none of which was successful below beds of Cretaceous age.

CRETACEOUS

Drilling activity in the Cretaceous trend was at a more exhilarated rate during 1947 than during any previous year since the development of the shallow Edwards limestone fields of Guadalupe and Caldwell counties. In all, 299 wells were drilled as Cretaceous tests either in the Balcones Fault-Line trend or in the area of the Edwards Plateau. Two-thirds of the total drilled were in proved or semi-proved areas and the remainder were of a wildcat classification. Of the 105 wildcat wells drilled in anticipation of Cretaceous production, six were successfully completed as oil discoveries. The fields of Cretaceous age account for 19 per cent of the total producing oil wells of the district and 4 per cent of the annual production with 6,932,024 barrels of oil from 2,934 oil wells.

The most interesting aspect of development in the Cretaceous has been the deepening of oil wells to new zones of productive porosity in the old shallow Edwards limestone fields. The success of these deepening jobs has to date obtained rather mediocre results, primarily caused by the inability to locate and isolate oil-productive from the water-bearing zones of porosity. Improved methods of coring and completing these wells indicate a likelihood of solving the difficulties and substantially prolonging the productive life of many of the old Edwards limestone fields.

The development of the shallower Navarro sands in the deep Edwards limestone fields of Atascosa County has proved this zone to be of greater economic value than that of the initial deep Edwards producing zone. Seventy oil wells

were completed in the Charlotte field and the most of these were completed in the Navarro producing zone.

UPPER EOCENE TREND

The Upper Eocene trend was the only geologic province to show a decrease in drilling activity as compared with the previous year. Two hundred and forty-nine wells of all categories, slightly more than 10 per cent of the district, were projected to zones of this trend and resulted in 133 successful completions.

Of the 98 wildcat wells drilled during the year, 18 were successfully completed, opening 10 new gas-productive areas and 6 new oil fields. Fifteen of the 18 new fields had no additional producers by the close of 1947. The development of the Wilcox-Queen City reservoirs to date indicates that eventually fields of this trend may possess a major part of the gas reserves of the South Texas district.

Eleven new gas reservoirs and three new oil reservoirs were found in proved areas during the year. The Cosden-Wilcox and Tulsita-Wilcox fields of Bee County and the Burnell-Wilcox field of Bee and Karnes counties were the most active for field development, having a total of 45 oil-well and 7 gas-well completions, or more than 50 per cent of the successful field completions for the trend. The fields of upper Eocene age accounted for 2 per cent of the total oil wells at the close of the year and contributed 4 per cent of the annual production from the district.

UPPER YEGUA-JACKSON TREND

Four hundred and eighty-two wells, both field and wildcat, were drilled in the shallow Yegua-Jackson trend during the year. Of the field wells, 201 of the 313 tests were successfully completed. The fields which were most developed were the Cam field of Duval County, a new discovery for 1947, with 22 oil completions, the Piedras Pintas field of Duval County with 22 oil completions, and the Hughes field of Webb County with 16 oil completions. The Piedras Pintas structure, a shallow piercement-type salt dome, was also accredited with 5 of the 15 new producing zones found in old fields of the Yegua-Jackson trend. The Shell Oil Company's Neuhaus well No. 2, in the Provident City field of Lavaca County, was plugged back and completed as an oil well in the Yegua after failure to produce in the Wilcox formation.

Thirty-two per cent of 5,101 of the producing oil wells of South Texas are in the Yegua-Jackson trend, and during 1947 produced 21,602,809 barrels of oil.

FRIO-VICKSBURG TREND

The reservoirs of the Frio-Vicksburg continue to be the most important geological province of South Texas both in percentage of successful completions and in probably ultimate reserves. Of the 1,322 wells drilled to zones of the Frio and Vicksburg, 1,048 or 79 per cent were completed as producers; 67 of the wells were dually completed.

A listing of the new producing zones in the multiple-pay fields of the Frio-Vicksburg trend would be far more impressive than the table showing the fields discovered in South Texas as for the year. Wells were completed in 78 new oil-producing zones and 40 gas-productive zones in 58 fields.

The extension of the Borregas field of Kleberg County by the drilling of 22 oil wells and 3 gas wells, 5 of the oil completions being new producing zones for the area, appears worthy of mention. The development in the Borregas field during 1947 has extended production to an area 8 miles in length and 5 miles in width, almost merging the Monte Negra and Stratton fields on the northeast with the Seeligson structure on the southwest.

The La Gloria field of Jim Wells and Brooks counties should be mentioned for the nine additional oil sands and one new gas sand found during the year. La Gloria was accredited with 47 oil completions and 3 gas completions. This structure, for many years considered as one of the more important gas reserves of South Texas, is now developing as a major oil reservoir.

In the Kelsey field of Brooks County and Starr county, 15 new oil reservoirs and 1 new gas reservoir were uncovered by the drilling of 49 tests. Important extensions were made in the Bonnie View field of Refugio County with the addition of the Wyrick area at the north.

The drilling of 169 wildcat wells resulted in the discovery of 25 new producing areas, 14 gas and 11 oil producers. The Bloomington field of Victoria County appears to be the most important discovery of the year.

The Texas Company's Yturria Land and Livestock Company No. 6, a wildcat well 2 miles northeast of the Raymondville field of the northwest part of Willacy County is the deepest well in South Texas to date; its total depth is 16,006 feet where mechanical difficulties forced the abandonment of the well. The well encountered at the total depth a formation which appeared to have productive possibilities but the operator was unable to make a test. As far as can be ascertained, the well did not penetrate the section below the Oligocene.

Seventy-six per cent of the oil production of the Railroad Commission of Texas, Oil and Gas Division Districts 1, 2, and 4, is produced from fields of the Frio and Vicksburg. The oil produced from the 7,166 wells of this trend amounted to 117,384,544 barrels. Ten of the fields produced more than one-half of the Frio-Vicksburg oil production.

UPPER OLIGOCENE AND LOWER MIOCENE TRENDS

Only 0.5 per cent of the wells drilled in South Texas were accredited the upper Oligocene-lower Miocene trend. Most of the completions in this trend result from tests that fail to produce from the deeper Frio or Vicksburg zones and were then plugged back for production in reservoirs of Miocene or upper Oligocene age. Two oil fields and one gas field were discovered in 1947 by wildcat drilling. Oil production from the fields of this trend amounted to 1,855,012 barrels for the year.

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DEVELOPMENTS IN EAST TEXAS IN 1947[1]

HOWARD H. LESTER[2]
Tyler, Texas

ABSTRACT

Drilling in East Texas continued active in 1947. Field-well completions totaling 557 wells are 6 per cent below the 1946 total. Completed wildcats totaling 101 wells are 9 per cent above the 1946 total.

Five new oil fields and three gas or gas-distillate fields were discovered. Five discoveries were completed in the Glen Rose, one each in the Eagle Ford, Woodbine, and Travis Peak formations. None appears to be a major discovery; however, the Blackfoot (Pettit) discovery in northern Anderson County may be proved important. The San Augustine (Pettit) discovery in northern San Augustine County stimulated leasing and exploration activities on the south flank of the Sabine uplift.

New producing zones were discovered at Carthage, Chapel Hill, Grapeland, Hawkins, Lassater, Quitman, Sand Flat, and Tri-Cities. Jurassic tests at Quitman, Hawkins, Coke, and Fairfield failed to disclose the downdip extent of Smackover porosity.

Geophysical exploration declined 34 per cent from 1946. An average of 13 reflection-seismograph crews, 2 gravity crews and 2 core-drill units was maintained through 1947. Exploration, which centered in the southern part of the district in 1946, shifted to the south flank of the Sabine uplift and to the northeast corner of the district.

INTRODUCTION

The East Texas district (Fig. 1), which includes 42 counties in the northeastern part of the state, covers the East Texas embayment in which more than 16,000 feet of Jurassic, Cretaceous, and Eocene sediments were deposited. Past drilling and exploration activities were fairly widespread, being more concentrated on the Mexia-Talco fault zone and the central and eastern parts of the district and lagging only in the Paleozoic belt, north and west of the Mexia-Talco fault zone. Prior to 1940, the Woodbine formation (Upper Cretaceous), occurring at depths of less than 5,000 feet, was the prime objective and prolific production was found at Mexia, Van, East Texas, and Hawkins. Since 1940, deeper production has been sought at depths of 5,000–10,000 feet and found in Lower Cretaceous objectives: the Paluxy, Rodessa, Pettit, and other zones. Developments in 1947 reflect the trend toward deeper drilling, with 6 discoveries in the Lower Cretaceous and only 2 discoveries in the Upper Cretaceous. Objectives below 10,000 feet remain relatively untested due to high drilling cost.

WILDCAT DRILLING

In all 658 wells were drilled in East Texas in 1947, of which 101 were wildcat wells. Wildcat completions increased 9 per cent, over 1946 in contrast to a 6 per cent decrease in field-well completions and a 4 per cent decrease in total well completions. A comparison of drilling activity in 1947 with the two previous years is shown in Table I.

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received March 31, 1948. Published by permission of the Shell Oil Company, Incorporated.

[2] Shell Oil Company, Incorporated. The writer expresses appreciation to G. C. Clark and W. E. Long for assistance in the preparation of this report.

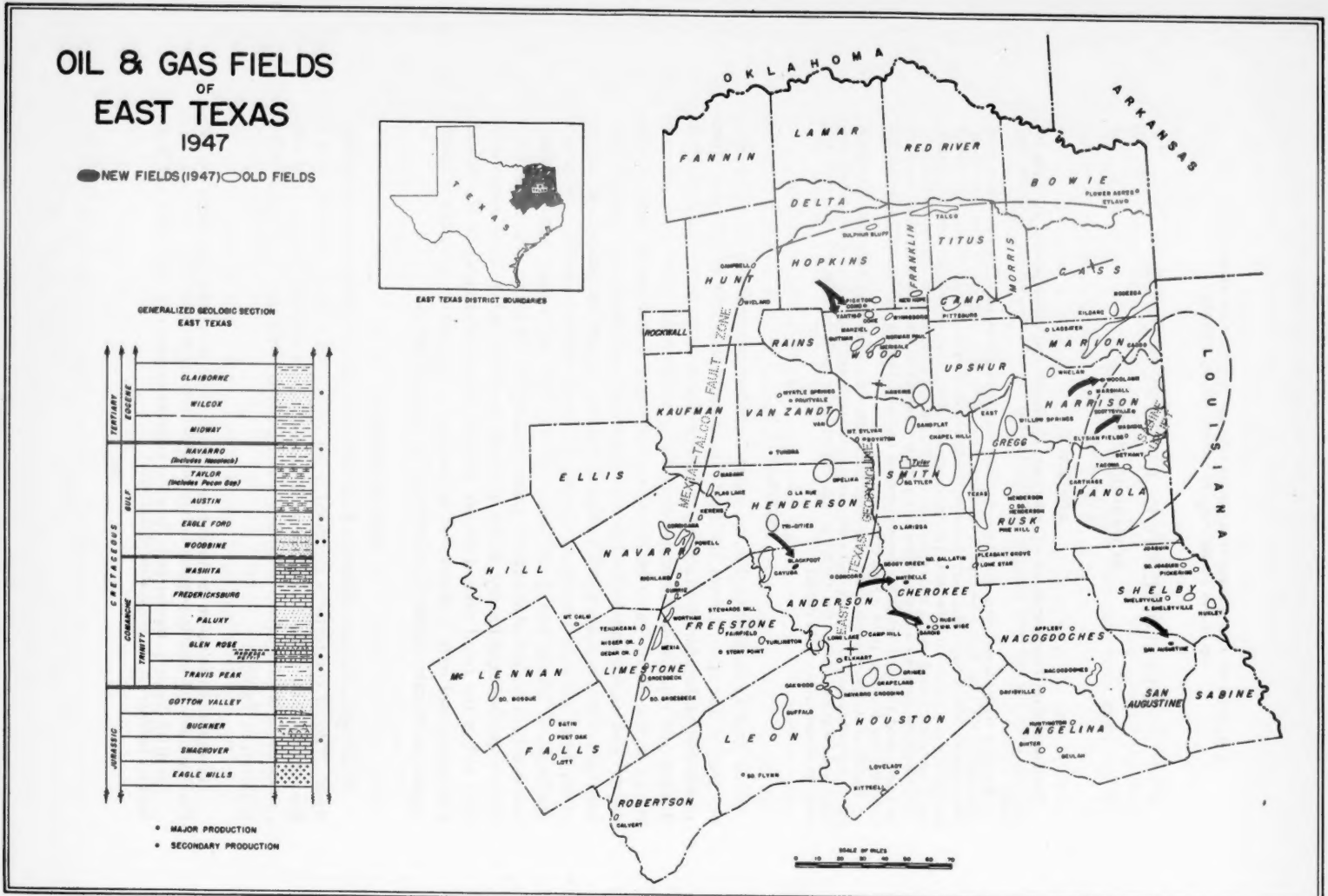


Fig. 1. Oil and gas fields of East Texas.

A larger majority of wildcat wells were Cretaceous tests. Of the 101 wildcats completed in 1947, 75 were completed in the Cretaceous, 13 in the Eocene (Wilcox), 7 in the Jurassic, and 6 in the Paleozoic. Wildcat drilling resulted in 5 new oil fields and 3 gas distillate fields, all of which produce from the Cretaceous. None appears to be a major discovery but of the 8 discoveries Blackfoot appears to be the most promising.

NEW FIELDS

Blackfoot (*Anderson County*).—The Blackfoot oil field is in the northern part of Anderson County 5 miles northwest of Montalba. The discovery well, the Sanders and Murchison's R. F. Broadway (Sides) No. 1, was completed on August 5 for an initial flowing potential of 406 barrels of 44.1° gravity oil per day through ¼-inch tubing choke. Flowing tubing pressure was 610 pounds, casing pressure 1,560 pounds, and the gas-oil ratio 562:1. Perforations at 9,736–9,740 and 9,750–9,758 feet are opposite a 15-foot zone of porosity at the top of the Pettit section of the lower Glen Rose.

TABLE I

COMPLETED WELLS

	1945	*1946*	*1947*
Field wells			
Oil wells	150	389	392
Gas wells	124	143	91
Dry holes	32	61	74
Total	306	593	557
Wildcat wells			
Oil wells	1	8	5
Gas wells	4	4	3
Dry holes	81	81	93
Total	86	93	101
Total completions	392	686	658

New pools and extensions included with field wells.
New discoveries included with wildcat wells.
Data for 1945 and 1946 from "Developments in East Texas in 1946," T. C. Cash and G. J. Loetterle

The discovery well also tested oil from a 12-foot zone of porosity in the Rodessa section of the lower Glen Rose. A 47-minute drill-stem test of the interval 8,956–8,971 feet recovered 540 feet of 40.8° gravity oil. This zone was cased off in favor of completion in the Pettit.

The discovery well produced a total of 24,800 barrels of oil through December 31, 1947. Oil from the discovery is being trucked to Corsicana where it is taken by The Texas Company.

The Blackfoot structure is a north-south trending anticline originally dis-

TABLE II

New Discoveries, 1947

Field	*County*	*Location*	*Survey*	*Operator*	*Well*	*Producing Formation*	*Perforated Interval (Feet)*	*Initial Potential*	*Discovery Method*	*Remarks*
Blackfoot	Anderson	5 mi. N.W. Montalba	I. P. Rinehart	Sanders & Murchison	Broadway (Sides) 1	L. Glen Rose (Pettit)	9,736–9,740 9,750–9,758	F. 406 BO ¼″ 44.1° gr.	Sur. Sub. Seis.	Rodessa tested oil
Como	Hopkins	3½ mi. S.E. Reilly Springs	Nacogdoches University	Delta	Coker 1	L. Eagle Ford	4,150–4,165	P. 137 BO 21.8° gr.	Sub.	Shows in U. Eagle Ford
Maydelle	Cherokee	3½ mi. N.W. Maydelle	G. J. Looney	Standard of Texas	New Birmingham Dev. Co. 1	M. Glen Rose (Bacon)	8,608–30 8,638–52	F. 6,320 MCFG 16.2 BD, 18 BW, 5/16″ (unofficial)	Sub. Seis.	Small vol. gas in Pettit
San Augustine	San Augustine	4 mi. N. San Augustine	E. Quirk	Hiawatha	W. A. Johnson 1	L. Glen Rose (Pettit)	8,130–60	F. 92.01 BO 9/64″	Seis. Sub.	No porosity in N. offset
Sardis (unofficial)	Cherokee	9 mi. S.W. Rusk	J. Hunt	General Crude	J. W. Summers 1	Woodbine	5,137–5,147 (OH)	115.28 BO 57.64 BSW 3/16″ 41.7°		Minor stratigraphic accumulation
Scottsville	Harrison	3 mi. E. Scottsville	P. Dougherty	Arkansas Fuel	M. C. McCauley 1	Travis Peak	6,446–6,452	F. 55 BO 10/64″	Seis. Sub.	Ceased flowing. N.E. offset dry
Woodlawn	Harrison	2½ mi. S.E. Woodlawn	J. E. White	Stanolind	George Slaughter 1	L. Glen Rose (Pettit)	6,356–6,440	9,600 MCF 45 BDPMM (unofficial)	Seis. Sub.	Travis Peak tested small vol. gas
Yantis	Wood	4 mi. E. Yantis	J. Walker	Humble	Rio Oil Corp. 1	L. Glen Rose (Rodessa)	7,932–7,950	11,000 MCF 70–100 BD/MM (OF)	Sub. Seis.	S.W. outposts testing oil in L. Eagle Ford
New Producing Zones, 1947										
Carthage	Panola	2 mi. E. Deadwood	J. Husband	Continental	Lewis Werner Saw Mill 1-B	L. Glen Rose (Gloyd)	5,163–5,168	F. 12,500 MCFG (OF)	Sub.	Making salt water
Chapel Hill	Smith	11 mi. E. Tyler	T. Payne	Chapel Hill Gas	Bina Rayford 1	Travis Peak	8,100–8,308	F. 101 BD 13/32″	Sub.	Grav. dist. 51D GOR 9,812:1
Grapeland	Houston	4 mi. N.W. Grapeland	I. Grooms	Lone Star	Dora Ritchey 1	Eagle Ford	5,885–5,896	F. 119.7 BO ¼″ 39.8° gr.	Sub.	5 additional Eagle Ford completions in 1947
Hawkins	Wood	4 mi. N. Hawkins	W. R. James	Humble	P. H. McKnight 1	L. Glen Rose (Rodessa)	8,935–8,966 (OH)	F. 1,100 MCFG 49 BD/MM	Sub.	Extreme N. flank well 900 ft. below crest of structure on Wb. datum
Lassater	Marion	5 mi. N.W. Lassater	M. W. Moody	Magnolia	Hall Est. 1	L. Travis Peak	8,736–8,750	F. 2,826 MCFG 116 BD 3/4″	Sub.	Previous production from Upper Travis Peak
Longwood	Harrison	5 mi. E. Leigh	W. C. Baker	Sam E. Wilson	Hearne	L. Glen Rose	5,578–5,602	F. 8,000 MCF (OF)	Sub.	Extension into Texas from Louisiana
Quitman	Wood	3 mi. N.W. Quitman	W. W. Lanier	A.O. & B.F. Phillips	Goldsmith 3-B	Eagle Ford (Sub-Clarksville)	3,940–3,960	P. 16.5 BO 3.5 BSW	Sub.	20.8° gr. oil
Sand Flat	Smith	8 mi. N. Tyler	F. Flores	H. L. Hunt	Oliver Black 1	M. Glen Rose	9,096–9,116 9,132–9,140	F. 79.75 BO ¼″ 45.6° gr.	Sub.	New pay for district
Tri-Cities	Henderson	7 mi. S.W. Athens	J. M. Y'Barbo	M. B. Chastain	J. M. Baker 1	L. Glen Rose (Rodessa)	7,671–7,691	F. 3,100 MCF (OF)	Sub.	Rodessa subsequently reclassified as an oil reservoir

Note.—Under Initial Potential: F., flowing; P., pumping; MCFG, thousand cubic feet gas; BO, barrels oil; BD, barrels distillate, (OF) open flow; S.W., salt water; BD/MM, barrels distillate per million; 1/8″, choke size; gr., gravity.
Under Discovery Method: Sub., subsurface; Seis., seismograph; Sur., surface.

covered by surface work and tested in the period 1930 to 1934 by four dry holes drilled to the Woodbine. Subsurface data from these wells disclosed an eastward shift of the structure with depth and in 1937 a 9,205 foot well was drilled on the crest of the deep structure to test the Rodessa section of the lower Glen Rose. This well, the American Liberty, Gage No. 1, encountered the Rodessa slightly higher than the subsequent discovery, but was abandoned as a dry hole about 700 feet above the Pettit producing zone and failed to test the zone in the Rodessa from which oil was recovered in discovery well.

The structure was further detailed by seismic work, and in 1947, location was made for the discovery well about 2 miles northeast of the original deep test. Texas and Phillips, the principal leaseholders, and Stanolind and Amerada contributed to the test. At the close of the year, The Texas Company was drilling two outpost wells.

Como (*Hopkins County*).—The Delta Drilling Company's W. H. Coker No. 1 6 miles south of Como in southern Hopkins County is the discovery well of the Como field, pumping 147 barrels of 21.8° gravity oil per day from a 6-foot sand in the lower Eagle Ford. Perforations are in the interval 4,150–4,165 feet. Showings of heavy black oil were noted in the sub-Clarksville sands of the upper Eagle Ford but no tests were made. The well was drilled to 4,210 feet or 200 feet above the Woodbine. The completion date is September 23.

The structure is reported to be a small low-relief anticline having 50 feet of closure. In 1946, the Delta's Livingston No. 1, 1,800 feet northwest of the subsequent discovery, was drilled to 8,642 feet, or 150 feet into the Travis Peak. The well encountered showings of black oil in the upper Eagle Ford but was abandoned as a dry hole.

An allowable of 100 barrels per day with no shut-down days was assigned to the discovery well. At the close of the year the discovery produced a total of 10,800 barrels of oil. The crude is being taken by truck to the Talco refinery. The principal leaseholders are Delta, Premier, and Woodley.

Maydelle (*Cherokee County*).—Maydelle is a new gas-distillate field 3½ miles northwest of Maydelle in western Cherokee County. The discovery well, the Standard of Texas' New Birmingham Development Company No. 1, gauged 147,000,000 cubic feet of gas per day, calculated open-flow potential (unofficial) and tested 6,320,000 cubic feet of gas per day, 16.2 barrels of 52.2° gravity distillate, and 18 barrels of acid water on a 5/16-inch choke. The well tested 3,068 pounds flowing tubing pressure, 4,035 pounds bottom-hole pressure, and 4,238 pounds initial reservoir pressure.

Production is from the Bacon limestone zone immediately below the Massive Anhydrite section of the middle Glen Rose. The electrical log indicates a porous zone of 6 feet net but drilling time and the radioactivity log indicate 12–14 feet. Perforations are in the interval 8,608–8,630 and 8,638–8,652 feet.

The well was drilled to 10,017 feet, or 515 feet into the Travis Peak formation. The Pettit section of the lower Glen Rose tested a small volume of gas distillate; the Rodessa and Travis Peak sections tested salt water.

per million, 1/8, choke size; gr., gravity.
Under Discovery Method: Sub., subsurface; Seis., seismograph; Sur., surface.

The structure, reported to be a faulted anticline, was discovered by subsurface data and detailed by reflection seismograph. The well has no outlet and is shut in.

San Augustine (*San Augustine County*).—San Augustine is a new lower Glen Rose (Pettit) discovery, 4 miles north of San Augustine townsite in the northern part of the county. The Hiawatha's W. A. Johnson No. 1, the discovery well, was drilled to 8,977 feet, or 450 feet into the Travis Peak, and was completed on June 16 for an initial flowing potential of 92.01 barrels of 42.2° gravity oil per day through a 9/64-inch tubing choke. The well tested 1,450 pounds flowing tubing pressure and a gas-oil ratio of 2,000:1. Attempts to increase production by reacidizing the producing zone resulted in a rapid increase in the gas-oil ratio. The total 1947 production was 7,840 barrels of oil.

The well is flowing through perforations in the interval 8,130–8,160 feet opposite a thin zone in the middle Pettit section aggregating 6 feet net porosity. A dry north offset well, the Hiawatha's Whitten No. 1, failed to encounter porosity in the producing zone indicating an abrupt northward termination of porosity. This discovery resulted in an active leasing campaign which spread through northern San Augustine and Sabine counties and southern Shelby County. J. C. Benedum, the Humble, Union, Arkansas, and Gulf are the principal leaseholders in the region.

Sardis (*Cherokee County*).—Sardis is the unofficial name of a Woodbine discovery 9 miles southwest of Rusk in southwestern Cherokee County. The General Crude's J. W. Summers No. 1, the discovery well, was completed for 115.28 barrels of 41.7° gravity oil and 57.64 barrels of salt water per day through a 3/16-inch tubing choke. The well is an open-hole completion in the Woodbine formation from 5,137 to 5,147 feet. The flowing tubing pressure is 460 pounds, casing pressure 775 pounds, and the gas-oil ratio 528:1. The well was completed on December 18.

The accumulation appears to be in a minor sand stringer at the top of the Woodbine and will probably be found of limited extent. Offset locations are planned for 1948.

Scottsville (*Harrison County*).—The Scottsville field is 3 miles east of Scottsville in eastern Harrison County, about 8 miles northwest of Waskom field. The Arkansas Fuel Oil Company's M. C. McCauley No. 1 was completed on April 19 for an initial potential of 55 barrels of 41° gravity oil per day through a 10/64-inch tubing choke. On the official test the well gauged 400 pounds flowing tubing pressure and 850 pounds casing pressure. The well produced 3,517 barrels of oil and then ceased flowing. The well is now shut in.

Perforations are in the interval 6,446–6,452 feet opposite a 6-foot sand, about 185 feet below the top of the Travis Peak formation. The producing sand is lenticular and the accumulation appears to be stratigraphic. A north offset to the discovery failed to encounter porous sand in the producing section and was abandoned.

Woodlawn.—The Stanolind's Slaughter No. 1, 2½ miles southeast of Wood-

lawn in northern Harrison County, is the discovery well of the Woodlawn field. The well was completed on October 31 for an estimated open-flow potential of 9,600,000 cubic feet of gas per day and tested 45 barrels of 60° gravity distillate per million. On an $\frac{1}{8}$-inch tubing choke, the well flowed 3,130,000 cubic feet of gas and 129 barrels of distillate in 24 hours and tested 2,150 pounds flowing tubing pressure and 2,400 pounds casing pressure. The well is flowing through perforations in the interval 6,356–6,440 feet from a zone in the middle and lower Pettit aggregating 20 feet net porosity.

The well was drilled to 10,375 feet, or 2,190 feet in the lower Cotton Valley and plugged back to 6,457 feet. An upper Travis Peak sand encountered at 6,790 feet tested salt water and a small volume of gas. Perforations opposite this sand were squeezed.

Subsurface data indicates the structure to be a low-relief anticline on the northwest flank of the Sabine uplift. The discovery well is about 50 feet higher than the Stanolind and Continental's Harris No. 1—a well drilled in 1945, 2 miles south of the discovery and abandoned after swabbing salt water from the Pettit. No other wells have been drilled on the structure and the probable extent of the accumulation is not apparent.

The well is now shut in for lack of an outlet.

Yantis.—A new Rodessa gas-distillate field was discovered in northwestern Wood County, 4 miles east of Yantis townsite. The discovery well, the Humble Oil and Refining Company's Rio Oil Corporation No. 1, was completed on August 15 for an initial potential of 11,000,000 cubic feet of gas per day, calculated open flow. Tests indicate a high though somewhat variable distillate content for the gas. On a $\frac{3}{8}$-inch choke the well produced 444.26 barrels of distillate and 5,580,000 cubic feet of gas per day, and recorded 2,616 pounds flowing tubing pressure.

The well is flowing through perforations at 7,932–7,950 feet opposite a porous interval in the middle Rodessa. Two higher zones of porosity in the upper Rodessa tested gas-distillate cut mud and water cushion and a lower zone in the lower Rodessa tested salt water. The well was drilled to 8,510 feet, a 132-foot penetration of the Travis Peak. The plug-back total depth is 8,205 feet.

The discovery well is located on the crest of a small domal anticline originally tested by a 6,500-foot Paluxy dry hole drilled in 1939. Subsurface information disclosed by this and near-by wells and supplemented by seismograph data led to the discovery of the field.

Gas from the discovery well is being used in the drilling of a southwest outpost well, the Humble's Rhodes No. 1.

FIELD DEVELOPMENTS

Field completions totaling 557 wells declined 6 per cent over 1946 (Table I). Large decreases in the number of completions at Carthage and Hawkins was responsible for the decline. Completions in other fields, particularly Merigale-Paul,

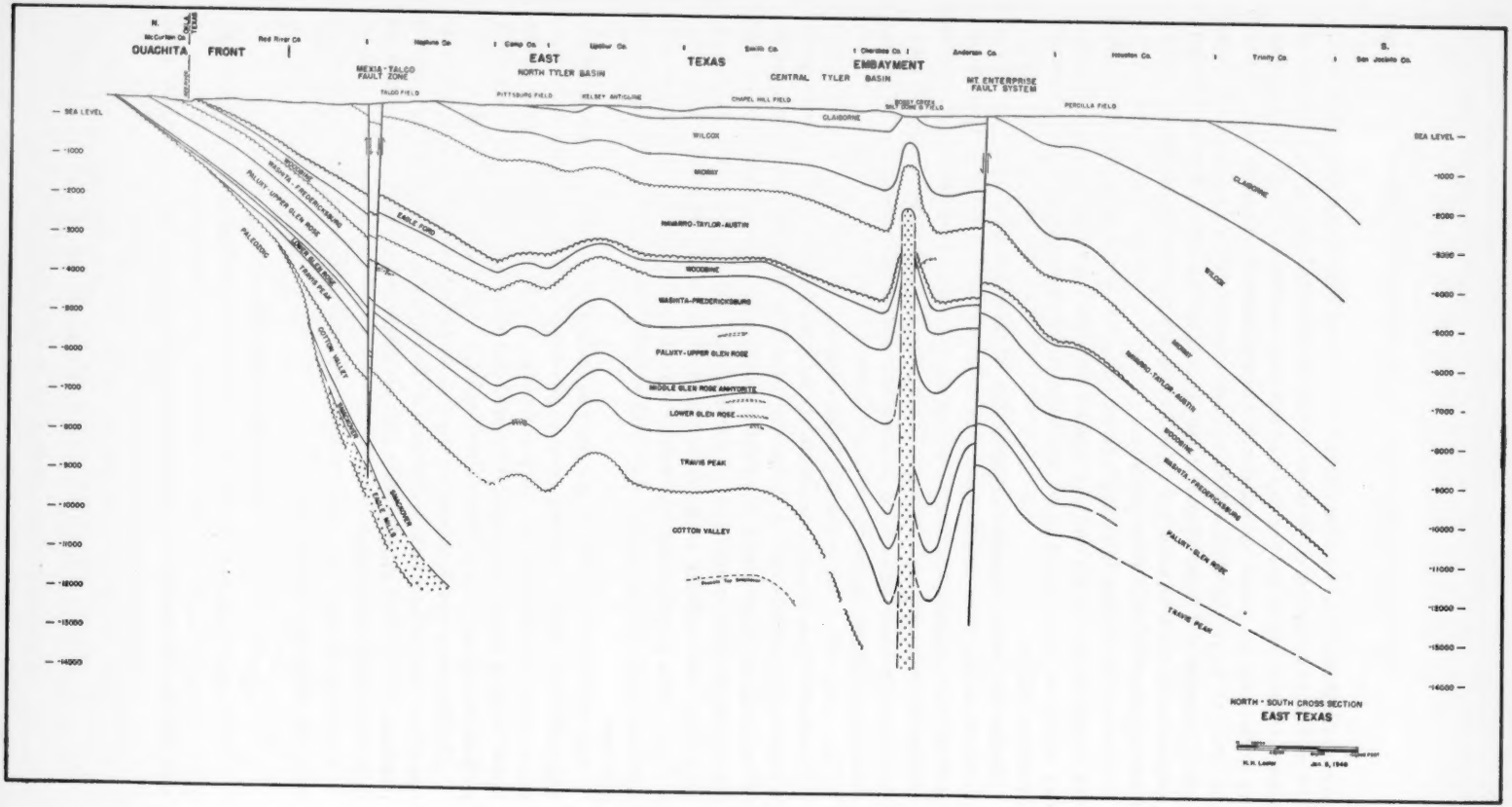


FIG. 2.—North-south cross section, East Texas.

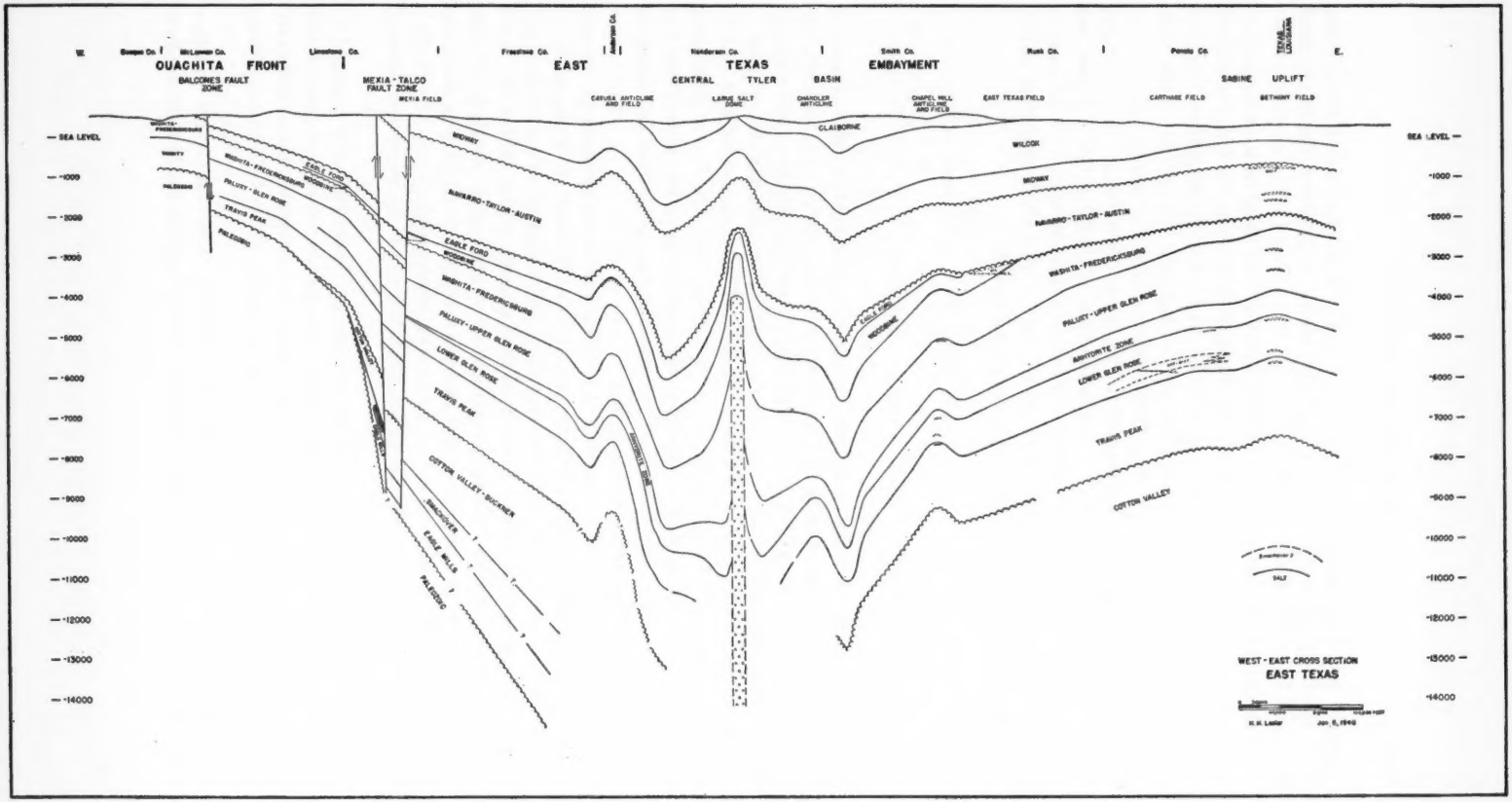


FIG. 3.—West-east cross sect ion, East Texas.

increased over 1946. Field developments resulted in 8 new-pool discoveries. These are in the Carthage, Chapel Hill, Grapeland, Hawkins, Lassater, Quitman, Sand Flat, and Tri-Cities fields (Table II).

Carthage (*Panola County*).—The active development program in progress during the period 1944–1946 declined rapidly in 1947. In contrast to 110 completions in 1946, 51 wells were drilled in 1947, of which 14 were dual completions, 29 were single completions, and 8 were dry holes. On January 1, 1948, 287 wells were producing, of which 170 wells were dual producers and 117 were single completions. Net production in 1947 amounted to 127,575,517 MCF of gas and 1,971,276 barrels of condensate. Cumulative production was 301,307,377 MCF of gas and 4,580,772 barrels of condensate. The proved area in the Carthage field amounts to 230,000 acres and the estimated ultimate recovery is 6½ trillion cubic feet of gas.

Total completions by producing zones are as follows.

Zone	*Gas Completions*	*Oil Completions*
Rodessa	33	1
Upper Pettit	177	0
Lower Pettit	224	2
Travis Peak	13	7

At the close of 1947 five gas plants were serving the field. These include the Arkansas-Carthage plant with a daily capacity of 25,000,000 cubic feet, the Arkansas-Panola plant with a daily capacity of 50,000,000 cubic feet, the Chicago Corporation plant with a daily capacity of 150,000,000 cubic feet, the Lone Star Producing plant with a daily recycling capacity of 50,000,000 cubic feet and an absorption capacity of 100,000,000 cubic feet daily, and the Union Producing Company plant with a daily capacity of 100,000,000 cubic feet absorption and 200,000,000 cubic feet dehydration. The Arkansas-Panola plant is expanding to a daily capacity of 100,000,000 cubic feet.

During 1947, gas was discovered in the Gloyd zone of the Rodessa on the east side of the field. The new-pool discovery, the Continental Oil Company's L. Werner No. 1-B, was completed for 12,500,000 cubic feet of gas, open-flow potential. Another completion of interest on the east side of the field is the Sun's (Rogers Lacy) Smith No. 1 dual oil completion flowing 234.58 barrels of oil from Pettit perforations at 5,902–5,914 feet and 234.8 barrels of oil from perforations at 6,086–6,092 feet. Pettit oil production established previously in the Skelly's Matthews No. 1 on the west side of the field, appears to be restricted to small local accumulations.

Chapel Hill (*Smith County*).—Developments at Chapel Hill were featured by the opening of the Lone Star recycling plant. The plant is recycling approximately 35,000,000 cubic feet of gas daily from the Paluxy, supplemented by an additional 5,000,000 cubic feet of gas from the Rodessa and Pettit. The processed gas is being used to repressure the Paluxy reservoir.

Field developments include a new-pool discovery, the Chapel Hill Gas System's Bina Rayford No. 1, completed in the Travis Peak for 101 barrels distillate

per day on a 13/32-inch tubing choke with 300 pounds tubing pressure, 425 pounds casing pressure and a gas-oil ratio of 9,812:1. Production declined to 40 barrels per day and a small productive area is indicated.

A Paluxy oil accumulation was discovered south of Paluxy gas production with the completion of the Chapel Hill's J. B. Yancey No. 2, pumping 255 barrels of 16.6° gravity oil per day from the interval 5,592–5,615 feet. Wells drilled in the vicinity of this test limit the extent of the prospective area.

Coke (*Wood County*).—No exploitation wells were drilled in 1947; however, one important exploratory test, the Amerada's Coke Unit No. 2, well No. 1, was drilled as a projected Smackover test on the Paluxy crest of the Coke structure. At 9,648 feet in the basal Travis Peak sandstones, the hole had deflected 11°, forcing abandonment of the well. A dipmeter survey indicated formation dips of 15° at 9,016 feet, 35°–55° at 9,366 feet, 46° at 9,572 feet, and 65°–80° at 9,612 feet. Cores from the interval 9,141–9,147 feet revealed dips of 35°. These data plus the domal configuration of the Coke structure suggest the presence of a deep-seated salt dome.

East Texas field.—Completions in 1947 totalled 152 wells compared with 63 wells in 1946. In all, 675 wells were abandoned in 1947, leaving 22,841 producing oil wells and 4,780 abandoned wells. In the month of December, 13,024 wells were flowing, 9,701 wells were pumping, and 116 wells were temporarily off production. Total production for the year was 116,947,115 barrels of oil, and cumulative production for the field to January 1, 1948, was about 2,474,450,000 barrels of oil. The producing area includes 126,896 productive acres incorporated in 2,993 leases.

Daily average water production was 588,524 barrels, of which 509,528 barrels were injected into the Woodbine reservoir through 78 injection wells. Reservoir pressures were maintained at about 1,020 pounds by salt-water injection and by decreasing slightly the monthly fluid withdrawals.

Fairfield (*Freestone County*).—The Fairfield field, a low-relief anticline productive in the Woodbine and Travis Peak formation, was tested to the depth of 14,331 feet by The Texas Company's W. M. White No. 1. A projected Smackover test, the well encountered the top of the Jurassic section at about 9,700 feet and penetrated 1,500 feet of typical Cotton Valley sandstones and mudstones, 800 feet of hard black splintery shale, and 2,300 feet of hard dense crystalline and oölitic limestone. The top of the limestone appears to be lower Cotton Valley in age, and slightly porous oölitic limestone with sulphur odors encountered below 13,157 may be the downdip equivalent of Smackover limestone. However, no formations comparable with the updip Buckner or Smackover were penetrated.

Gas showings encountered 1,500 feet below the top of the Cotton Valley tested 75–100 pounds surface pressure during a 48-hour drill-stem test. Gas was tested from poorly developed porosity in the Pettit section of the lower Glen Rose. After repeated attempts failed to establish production in these zones, the well was plugged back for completion in the Woodbine reservoir.

Grapeland (*Houston County*).—Discovery of oil from the sub-Clarksville sand zone of the Eagle Ford formation featured developments on the flanks of Grapeland field. Previous production had been gas-distillate from the Woodbine formation.

The sub-Clarksville discovery well is the Lone Star Producing Company's Dora Ritchey No. 1, completed June 17, 1947. Initial production was 119 barrels of 39° gravity oil in 24 hours on ¼-inch choke, from perforations at 5,885–5,896 feet. Tubing pressure was 265 pounds, casing pressure 1,245 pounds, and the gas-oil ratio 902:1. Oil production from the sub-Clarksville had been indicated previously by the Geier-Jackson's A. D. Adams No. 1, from which 600 feet of oil was recovered in a 15-minute drill-stem test.

At the end of the year six sub-Clarksville wells had been completed, one of which was a former Woodbine producer plugged back for oil production.

The oil accumulation in the sub-Clarksville sand is stratigraphic, closure being formed on the flanks of the Grapeland anticline by the truncation of the sub-Clarksville sand and the overlap of the Austin chalk. Sub-Clarksville sand is not present on the crest of the structure, but was removed by erosion prior to the deposition of the overlying Austin chalk. Wells completed to date are producing from a net sand section of 3–10 feet.

The oil is being processed locally at the plants of Geier-Jackson, Inc. and the Lone Star Producing Company—the principal leaseholders in the prospective area.

Hawkins (*Wood County*).—Drilling activity, maintained at a high level in 1946 following the lifting of the restrictions of the Petroleum Administration for War, declined sharply in 1947 as the development of inside locations neared completion. Nineteen producing wells were completed in the Woodbine, 10 dry holes were drilled, and one well was completed in the Rodessa section of the lower Glen Rose. The latter well, the Humble's P. H. McKnight No. 1, tested 1,100,000 cubic feet of gas per day, calculated open-flow potential and 49 barrels of distillate per million cubic feet of gas. The well is an open-hole completion at 8,935–8,966 feet and is located on the extreme north flank of the Hawkins structure. On the Woodbine datum the well is about 900 feet below the crest of the structure. An extensive accumulation is possible; however, productivity may be limited by the low porosity and permeability of the producing reservoir.

The McKnight well, one of the important exploratory tests in the district, was drilled to 14,629 feet and penetrated 1,688 feet of Travis Peak sandstones and redbeds, 1,269 feet of typical Cotton Valley sandstone, 235 feet of hard black shale, and 1,521 feet of hard, dense black limestone which resembles the Cotton Valley limestone lithologically, but which is considered by some observers to be the non-porous downdip facies of the Smackover limestone. At 14,411 feet the well encountered salt to the total depth of 14,629 feet. No commercial showings of oil or gas were noted in the Jurassic sediments and the well was plugged back for completion in the Rodessa.

Merigale-Paul (*Wood County*).—Developments in the Merigale field, discovered in 1944, and the Norman Paul field, discovered in 1946, disclosed the fact that both fields are on the same fault structure and are producing from a common reservoir—the sub-Clarksville section of the upper Eagle Ford formation. Accordingly a common proration schedule was assigned to the fields under the combined name of Merigale-Paul field. Daily allowables in the Merigale wells, originally reduced from 100 to 60 to 40 barrels per day due to rapid bottom-hole pressure declines, were raised to 50 barrels per day.

The relatively shallow depth to production (4,800 feet) and the adoption of a 10-acre spacing pattern stimulated drilling and resulted in a total of 70 completions, 66 of which are producing oil wells.

Opelika (*Henderson and Van Zandt counties*).—Developments on the flanks of the Opelika structure, where Rodessa oil was discovered in 1946, continued at a steady pace in 1947. In all, 19 wells were drilled, of which 17 were completed in the Rodessa section of the lower Glen Rose, 1 in the Travis Peak, and 1 abandoned as a dry hole. A 790-foot gas column and a minimum oil column of 300 feet are apparent in the Rodessa; the oil-salt water contact has not been encountered.

Oil production in 1947 totalled 565,176 barrels and recycling of Rodessa gas by the Lone Star Gas Company yielded 36,847,784 gallons of condensate.

Quitman (*Wood County*).—In 1946 Eagle Ford production was discovered above the main (Paluxy) producing reservoir. In 1947 exploitation of these shallow sands resulted in an increase in drilling activity. Compared with 11 completions in 1946, 30 wells were completed in 1947 of which 5 were completed as oil wells in the Paluxy, 19 in the lower Eagle Ford, and 5 in the sub-Clarksville section of the upper Eagle Ford. One dry Eagle Ford test was drilled.

Although showings had been noted in the sub-Clarksville sands in several previous tests, production from that zone is new. The new-pool discovery, the A. O. and B. F. Phillips' J. B. Goldsmith No. 3-B, was completed through perforations at 3,953–3,973 feet, pumping 16.5 barrels of oil and 3.5 barrels of salt water in 24 hours.

An important exploratory test, the Shell Oil Company's J. B. Goldsmith No. 12, was drilled to 11,283 feet. A projected Smackover test, the well encountered a normal Travis Peak section from 8,425–9,761 feet and Cotton Valley sands and shales from 9,761–11,158 feet. The well then drilled from Cotton Valley sands directly into crystalline salt without encountering either the Buckner redbeds or the Smackover limestone.

Sand Flat (*Smith County*).—In all, 20 wells were completed at Sand Flat, of which 17 are oil wells in the Paluxy, 2 are dry holes, and 1 is a new pool discovery. The new-pool discovery, the Hunt's Oliver Black No. 1, was completed for 79.75 barrels of 45.6° gravity oil per day through $\frac{1}{4}$-inch choke. Perforations at 9,096–9,116 and 9,132–9,140 feet are opposite thin streaks of porous oölitic limestone included in the Massive Anhydrite section of the middle Glen Rose. Production from this zone is new, not only in the field but in the district.

Tri-Cities (*Henderson County*).—The discovery of gas distillate in the Rodessa section of the lower Glen Rose and the subsequent reclassification of the Rodessa as an oil reservoir featured developments at Tri-Cities in 1947. Previous production had been from the Bacon limestone zone at the base of the middle Glen Rose anhydrite.

On June 26, M. B. Chastain's J. M. Baker No. 1 was officially completed in the Rodessa for an open-flow potential of 3,100,000 cubic feet of gas per day through perforations at 7,671–7,691 feet. In October, M. B. Chastain's L. R. Riddlesperger No. 1 was completed in the Rodessa for 533 barrels of 48.1° gravity oil per day through a 14/64-inch tubing choke. Five other wells in the field, reported as completions in the Bacon limestone, were then recompleted in the Rodessa.

At the close of 1947, 19 wells were producing, of which 12 are classified as gas-distillate wells completed in the Bacon limestone and 7 are classified as oil wells completed in the Rodessa. Ten producing wells and 1 dry hole were drilled in 1947 and 7 additional wells were drilling or were in the process of completion.

Waskom (*Harrison County*).—A renewal of drilling activity was apparent in the Waskom field. Developments include a total of 10 gas wells and two oil wells, of which 7 are dual completions in the Travis Peak and the Pettit section of the lower Glen Rose formation. Total production in 1947 was 146,000 barrels of 41°–60° gravity crude, 29,728 barrels of condensate, and 3,669,946 MCF of gas. Cumulative production to January 1, 1948, exceeds 960,300 barrels of crude and condensate and 158,625,990 MCF of gas. Since discovery in 1924, 82 gas wells and 7 oil wells have been completed and production has been established in the Nacatoch, Blossom, Austin, Goodland, Paluxy, Rodessa, Pettit, and Travis Peak formations.

EXPLORATORY TESTS

Lower Cretaceous.—Two significant Travis Peak tests were drilled in the southeastern corner of the district. The first well, the Hiawatha's W. A. Johnson No. 1, 4 miles north of San Augustine in northern San Augustine County, disclosed thin but productive streaks of porosity in the Pettit section of the lower Glen Rose and precipitated an active leasing and exploration campaign. The second well, M. E. Davis' Temple Lumber Company No. 1, 5 miles east of Geneva in northern Sabine County, encountered numerous zones of porosity in the middle Glen Rose, a section which is non-porous and non-productive throughouth the greater portion of the East Texas district.

Jurassic.—Important deep tests were drilled at Coke, Quitman, Hawkins, and Fairfield. These tests were expected not only to evaluate untested Smackover possibilities but also to provide stratigraphic information in regard to the down-dip limits of Smackover porosity. Results were disappointing. The Coke and Quitman tests were abandoned without reaching their intended objectives. The Hawkins and Fairfield tests encountered a dense non-porous Jurassic limestone and shale section below the Cotton Valley sands.

GEOPHYSICAL EXPLORATION AND LEASING ACTIVITY

In 1945 and 1946 exploration and leasing centered in the southern part of the district following the disclosure of well developed Woodbine sands in southern Houston County. This activity declined early in 1947 and scattered throughout the basin. However, the discovery of the San Augustine field focused attention to Cretaceous objectives on the south flank of the Sabine uplift, and at the close of the year an active leasing campaign developed chiefly in Shelby, San Augustine, and Sabine counties.

Seismic activity was also apparent in Bowie and Cass counties in the northeastern part of the district.

The discovery of oil on the Blackfoot structure resulted in several mineral purchases; however, no active leasing campaign developed for most of the area was under lease prior to the drilling of the discovery well.

Geophysical activity declined 34 per cent from 1946. An average of 13 seismograph crews, 2 gravity crews, and 2 core-drill units were maintained.

1947 TRENDS

Although the amount of drilling, leasing, and exploration was less in 1947 than in 1946, activity was exceptionally steady throughout the year and promises to extend well into 1948.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 1024-1031, 1 FIG., 3 TABLES

DEVELOPMENTS IN UPPER GULF COAST OF TEXAS IN 1947[1]

PAUL H. CLARK[2]
Houston, Texas

ABSTRACT

The highlight of developments during 1947 was the leasing of certain submerged land in the Gulf of Mexico by thirteen companies. Leases cover 378,155 acres on 26 prospects. There is considerable hope that important new discoveries may result.

There were 874 wells drilled in the district in 1947, representing a 28.3 per cent increase over 1946. The increase was more marked in exploratory drilling than in field development.

Wildcats, which increased 35.5 per cent over 1946, resulted in 21 new discoveries as compared with only 15 in 1946, representing a 40 per cent increase. All of the new discoveries are of minor importance. They include 10 oil fields, 8 gas-condensate fields, and 3 dry-gas fields, New sands were found in 9 of the new fields during 1947.

An idea of the importance of development in old fields may be gained from the various estimates on additions to reserves in the district which show that from six to ten times as much oil and about twice as much gas were added from this source as from all the new fields combined. Field development was up 26.5 per cent over 1946 and was more successful than it was last year. There was more concentration of drilling on old piercement domes than for several years. A total of 51 important developments in 44 old fields during 1947 include 29 new sands, 15 new reservoirs, and 7 extensions.

Geophysical work increased in 1947 over 1946 and continued to lead in finding new fields in the district. Subsurface work was becoming of increasing importance and should be given a large share of the credit for adding to the reserves of old fields in 1947.

A new interior piercement salt dome was discovered in central Madison County, but no production was established.

The first Woodbine sand production for the district was obtained from a small gas well in the Glendale field of Trinity County. The trend will be limited to the extreme north part of the district.

Oil production in 1947 amounted to 191,166,000 barrels, up 6 per cent over 1946 and setting an all-time record except for the war year, 1944, when production was slightly greater.

INTRODUCTION

The Upper Gulf Coast district of Texas is composed of 26 counties in the southeastern part of the state, bounded on the east by Louisiana, on the south by the Gulf of Mexico, and on the west and north by county lines in Texas (Fig. 1). The area is identical with Texas Railroad Commission (state oil and gas regulatory body) District No. 3, deleting Fayette and Lee counties.

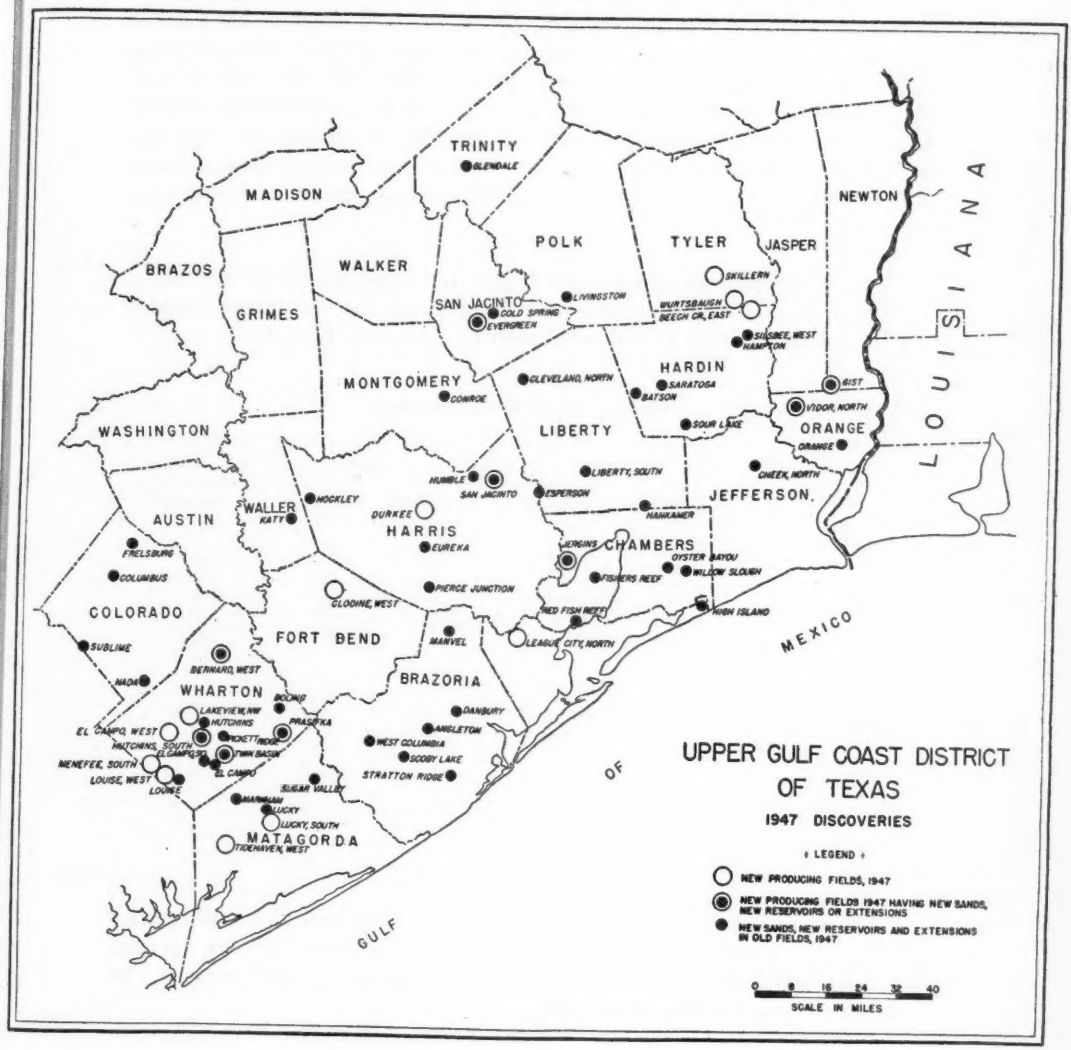
During the year of 1947 this mature oil district produced 191,166,000 barrels of crude, more than one-tenth of the oil produced in the United States and more than 6 per cent of the total world production.

HIGHLIGHT

Action taken by the State of Texas in calling for sealed bids on certain submerged land in the Gulf of Mexico led developments for the year and opened a vast new area for exploration and drilling. During November, 13 companies submitted high bids totaling $7,211,674.68 for 378,155 acres on 26 prospects which

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, March 15, 1948. Published by permission of the Humble Oil and Refining Company.

[2] Humble Oil and Refining Company. The writer acknowledges with thanks the furnishing of a list of important exploratory wells by S. A. Berthiaume of the committee on statistics of exploratory drilling which was most helpful in assembling data on this subject.


TRINITY
GLENDALE
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NEWTON
POLK
TYLER
JASPER
BRAZOS
WALKER
SKILLERN
LIVINGSTON
SAN JACINTO
GOLD SPRING
EVERGREEN
WURTSBAUGH
BEECH CR., EAST
SILSBEE, WEST
HAMPTON
GRIMES
HARDIN
SARATOGA
BATSON
GIST
VIDOR, NORTH
MONTGOMERY
CONROE
CLEVELAND, NORTH
WASHINGTON
LIBERTY
SOUR LAKE
ORANGE
ORANGE
LIBERTY, SOUTH
CHEEK, NORTH
HUMBLE
SAN JACINTO
ESPERSON
HOCKLEY
JEFFERSON
AUSTIN
WALLER
KATY
DURKEE
HARRIS
EUREKA
HANKAMER
FRELSBURG
COLUMBUS
HIGGINS
CHAMBERS
OYSTER BAYOU
WILLOW SLOUGH
FISHERS REEF
PIERCE JUNCTION
COLORADO
CLODINE, WEST
RED FISH REEF
HIGH ISLAND
FORT BEND
MANVEL
LEAGUE CITY, NORTH
SUBLIME
BERNARD, WEST
NADA
WHARTON
BRAZORIA
LAKEVIEW, NW
HUTCHINS
BOONE
DANBURY
EL CAMPO, WEST
HUTCHINS, SOUTH
PRASEKA
ANGLETON
PICKETT
WEST COLUMBIA
TWIN BASIN
SCOBY LAKE
MENEFEE, SOUTH
EL CAMPO
STRATTON RIDGE
LOUISE, WEST
LOUISE
SUGAR VALLEY
MARKHAM
LUCKY
LUCKY, SOUTH
MATAGORDA
TIDEHAVEN, WEST
GULF
OF
MEXICO
LOUISIANA
UPPER GULF COAST DISTRICT
OF TEXAS
1947 DISCOVERIES
+ LEGEND +
NEW PRODUCING FIELDS, 1947
NEW PRODUCING FIELDS 1947 HAVING NEW SANDS, NEW RESERVOIRS OR EXTENSIONS
NEW SANDS, NEW RESERVOIRS AND EXTENSIONS IN OLD FIELDS, 1947
0 8 16 24 32 40
SCALE IN MILES

FIG. 1

are located from one to 24 miles offshore and extend from High Island on the northeast to the southern tip of the district. Leases were taken on the basis of geophysical work. The Miocene trend on which these prospects are located has not made outstanding contributions to the oil production from this district. Nevertheless, there are certain stratigraphic reasons for expecting the trend to improve in a downdip or offshore direction and there is considerable hope that important new discoveries may be in the offing. Rapid development is probable and at least two companies plan to commence drilling operations during 1948.

DRILLING

There were 874 wells drilled in the Upper Gulf Coast district in 1947, representing an increase of 28.3 per cent over 1946. The increase was more marked in exploratory drilling than in field development as shown by Table I.

TABLE I

COMPARISON OF DRILLING ACTIVITY

	1946		*1947*		*Percentage Increase 1947 over 1946*
	No. Wells	*Percentage*	*No. Wells*	*Percentage*	
Field wells*					
Oil	343	59.5	430	62.6	33
Gas	77	14.	94	13.7	22
Dry	143	26.5	163	23.7	14
Total wells	543	100.0	687	100.0	26.5
Wildcats					
Oil	8	5.8	10	5.3	25
Gas	7	5.1	11	5.9	71.5
Dry	123	89.1	166	88.8	35
Total wells	138	100.0	187	100.0	35.5
Grand total wells	681		874		28.3

* Includes field wildcats.

NEW FIELDS

As a consequence of the increase in wildcatting, there were 21 new discoveries in 1947 (Fig. 1 and Table II), representing a 40 per cent increase over the total of 15 in 1946. The percentage of successful wildcats also gained, being 11.2 as compared with 10.9 per cent last year.

Unfortunately all of the new fields are of minor importance. They include 10 oil fields, 8 gas-condensate fields, and 3 dry-gas fields. Of these, 12 produce from the Frio including one from the marine lower Frio, which is the equivalent of the "Hackberry" of southwestern Louisiana, 6 from the Yegua, 2 from the Wilcox, and one from the Miocene. Although the Frio led as in past years, Yegua discoveries gained sharply (100 per cent) and include the most important new dis-

TABLE II

NEW FIELDS DISCOVERED IN UPPER GULF COAST IN 1947

Field	*County*	*Operator*	*Discovery Well*	*Producing Formation*	*Producing Depth (Feet)*	*Type*	*Initial Production*
1. Jergins	Chambers	Kirby Petroleum	Fee 1	Frio	6,312–16	Oil	33 bbls. 49.6 Gr. oil, 3/16" ch., GOR 33,000/1, T.P. 2125#.
2. Clodine, West	Fort Bend	Frazier	Farmer 1	Yegua Dual	7,260–65	Gas-Condensate	25 bbls. 54.6 Gr. cond., 1/8" ch. GCR 48,300/1, C.P. 2250#.
					7,415–20	Gas-Condensate	45 bbls. 53 Gr. cond., 1/8" ch. GCR 65,000/1, T.P. 2425#.
3. League City, North	Galveston	Hunt & Wilson	Hunt-Wilson 1	Frio	9,654–58	Oil	82 bbls. 44.1 Gr. oil, 1/8" ch., GOR 9,290/1, T.P. 3000#.
4. Beach Creek, East	Hardin	American Republics et al.	Votaw Fee 1	Yegua	6,417–19	Oil	179 bbls. 39 Gr. oil plus 2% SW., 1/8" ch., GOR 1,269, T.P. 1100#.
5. San Jacinto	Harris	Houston Oil	Bender 1	Yegua	7,782–90	Gas-Condensate	90 bbls. 64 Gr. cond. and 3,601 MCF of gas, 1/4" ch., T.P. 2425#.
6. Durkee	Harris	Union Oil	Moore 1	Yegua	7,705–10	Gas-Condensate	Ungauged amount of gas with spray condensate, T.P. 2575#.
7. Lucky, South	Matagorda	Stanolind	Huebner 1	Frio	9,236–38	Oil	79 bbls. of 34 Gr. oil, GOR 1,570/1, T.P. 890#.
8. Tidehaven, West	Matagorda	(Ohio) Johnston	Surkamp 1	Frio	8,533–35	Oil	38 bbls. 43 Gr. oil, 7/64" ch., GOR 13,000/1, T.P. 1950#.
9. Gist	Newton	(Peeler) Std. of Texas & Highland Oil	Hankamer 1	Frio	5,743–45	Oil	96 bbls. of 30 Gr. oil, 7/64" ch., GOR 1,795/1, T.P. 1400#.
10. Vidor, North	Orange	(Hinkle) Gulf	Miller-Vidor (1) 2	"Hackberry"	7,772–78	Gas-Condensate	43 bbls. of 53 Gr. cond., plus 3,720 MCF gas, 1/4" ch., GCR 86,500/1, T.P. 2650#.
11. Evergreen	San Jacinto	Mac Drilling	Payne 1	Wilcox	7,682–7,702	Oi	76 bbls. of 37 Gr. oil plus 30% SW., 1/4" ch., GOR 658/1, T.P. 150#.
12. Skillern	Tyler	Amerada	Hooks 1	Yegua	4,925–30	Gas-Condensate	5 bbls. of 55 Gr. cond., plus 50% SW. and 1,360 MCF gas, 12/64" ch., GCR 272,000/1 T.P. 1750#.
13. Wurtsbaugh	Tyler	American Republics & Houston Oil	Kirby Lbr. 1	Wilcox	9,070–78	Oil	58 bbls. of 43 Gr. oil plus 43% SW., 1/2" ch. GOR 3,768/1, T.P. 200#.
14. Prasifka	Wharton	Cockburn	Wharton Bk. 1	Miocene	4,526–36	Gas	1,897 MCF dry gas, 1/4" ch., T.P. 1270#.
15. Louise, West	Wharton	Franklin	Steves 1	Frio	6,354–58	Gas-Condensate	30 bbls. 54 Gr. cond., 1/4" ch. GOR 107,600/1, T.P. 2315#.
16. Lakeview, Northwest	Wharton	Grant & Petkas	Rooker 1	Frio	4,049–55	Gas	2,563 MCF dry gas on 5/16" ch., T.P. 1600#.
17. El Campo, West	Wharton	Grubb & Hawkins	Peters 1	Frio	4,520–24	Oil	168 bbls. 22.8 Gr. oil, 5/32" ch., GOR 506/1, T.P. 558#.
18. Hutchins, South	Wharton	Richardson	Armour 3	Frio	5,889–92	Oil	177 bbls. 29 Gr. oil, 10/64" ch., GOR 1,888/ T.P. 1250#, C.P. 2275#.
19. Bernard, West	Wharton	Tide Water	Hudgins 1	Yegua	6,720–22	Gas-Condensate	40 bbls. 57.7 Gr. cond., 1/4" ch., GCR 72,000/1, T.P. 1430#.
20. Twin Basin	Wharton	Karsten	Tucker 1	Frio	7,082–86	Gas-Condensate	10 bbls. 54 Gr. cond. 10/64" ch., T.P. 2650#, GCR 325,000/1.
21. Menefee, South	Wharton	(Boyle) Frazier	Swanson 1	Frio	4,703–11	Gas	2,660 MCF dry gas, 1/4" ch., T.P. 1910#.

TABLE III. NEW SANDS, NEW RESERVOIRS AND EXTENSIONS DISCOVERED IN UPPER GULF COAST IN 1947

Field Name	County	Operator	Well	Depth to Production (Feet)	Type	Producing Formation	Classification
1. Angleton	Brazoria	Humble	M. W. Mettler B-1 (workover)	8,846	Gas-Condensate	Frio	New sand
2. Danbury	Brazoria	Humble	Bennett Oil & Gas 4	8,465	Gas-Condensate	Frio	New sand
3. Manvel	Brazoria	Owenby	Faulkhaber 1	3,952	Gas	Miocene	New reservoir
4. Manvel	Brazoria	Progress	Rash No. 1	4,594	Oil	Miocene	New sand
5. Manvel	Brazoria	Salt Dome	H. J. Way 1	4,246	Oil	Miocene	New reservoir
6. Scoby Lake	Brazoria	McCarthy	T. A. Munson 1	10,504	Gas-Condensate	Frio	New sand
7. Stratton Ridge	Brazoria	Cockrell	Seaburn 5	4,986	Oil	Miocene	New sand
8. West Columbia	Brazoria	The Texas Company	Phillips 27	6,640	Oil	Frio	New sand
9. Fishers Reef	Chambers	Humble	State 11-C	8,955	Oil	Frio	Extension 2,000' north
10. Oyster Bayou	Chambers	Morse	Broussard-Hebert 1	8,297	Oil	Marginulina	New sand
11. Willow Slough	Chambers	Sun	Broussard B-1	8,354	Gas-Condensate	Frio	New reservoir
12. Jergins	Chambers	Kirby	Kirby Fee 2	6,407	Oil	Frio	New sand
13. Red Fish Reef	Chambers	Humble	State A-34 (workover)	9,550	Oil	Frio	New sand
14. Columbus	Colorado	Pan American	Buescher 1	8,385	Gas-Condensate	Wilcox	New sand
15. Frelsburg	Colorado	Sinclair	Heinsohn 1	9,120	Gas-Condensate	Wilcox	New sand
16. Nada	Colorado	Ohio	Nada B-1	6,220	Gas-Condensate	Yegua	New sand
17. Nada	Colorado	Ohio	Amman A-1	9,916	Gas-Condensate	Wilcox	New sand
18. Sublime	Colorado	Tide Water	Stovall 1	8,039	Gas-Condensate	Wilcox	New sand
19. High Island	Galveston	Mecom	Cade 8-A	7,146	Oil	Miocene	New reservoir
20. Batson	Hardin	Hawkins et al.	Hooks 1	5,410	Oil	Yegua	Extension 3,500' northwest
21. Hampton	Hardin	American Rep.-Houston Oil	Hampton Fee 3	7,315	Oil	Yegua	New sand
22. Saratoga	Hardin	Falcon-Seaboard	Bashara 1	7,338	Oil	Yegua	Extension 3,500' southeast,
23. Saratoga	Hardin	Sun	McShane 3	4,054	Oil	Yegua	New reservoir
24. Sour Lake	Hardin	Hankamer	Runge 3	3,950	Oil	Yegua	New reservoir
25. Silsbee, West	Hardin	American Rep.-Houston Oil	Elliott Fee 4	7,258	Oil	Yegua	New sand
26. Eureka	Harris	Houston Oil	Helberg-Lackner 1	8,418	Gas-Condensate	Yegua	New sand
27. Esperson	Harris	(Eli Marks) Atlas	Cohn Estate 1	8,695	Gas-Condensate	Yegua	New reservoir
28. Hockley	Harris	Magnolia	Warren Ranch 2	5,735	Oil	Yegua	New sand
29. Hockley	Harris	Magnolia	Warren Ranch 6	3,640	Oil	Cap Rock	New reservoir
30. Humble	Harris	Humble	House 2	4,688	Oil	Yegua	Extension 1,000' north
31. Pierce Junction	Harris	McCarthy	Mowery 1	7,575	Oil	Vicksburg	New reservoir
32. San Jacinto	Harris	Houston Oil	Elkins 1	8,342	Gas-Condensate	Yegua	New sand
33. Cheek, North	Jefferson	Karsten	Phelan 6	8,190	Gas-Condensate	"Hackberry"	New sand
34. Hankamer	Liberty	Gulf	Boyt 29	7,022	Oil	Frio	New sand
35. Cleveland, North	Liberty	(Hamill) Karstens	Stuart 1	5,775	Oil	Yegua	Extension 1 mile southwest
36. Liberty, South	Liberty	Josey	Mitchell 2	5,902	Oil	Yegua	New reservoir
37. Lucky	Matagorda	Stanolind	Thompson 4	10,395	Gas-Condensate	Frio	New sand
38. Markham	Matagorda	Thompson-Trull	Metzger 1	2,445	Oil	Miocene	New sand
39. Sugar Valley	Matagorda	Humble	Truitt 1	9,975	Oil	Frio	New sand
40. Conroe	Montgomery	McDaniel	Williams 1	5,068	Oil	Yegua	Extension 4,200' southeast Upper Cockfield sand
41. Gist	Newton	Standard of Texas	Hartburg 1	5,619	Oil	Frio	New sand
42. Vidor, North	Orange	Gulf	Miller-Vidor 1	6,934	Gas-Condensate	Frio	New sand
43. Orange	Orange	Sun	Lutcher-Moore 2	7,601	Oil	"Hackberry"	New sand
44. Orange	Orange	Bowles	Granger 1	4,437	Oil	Miocene	New reservoir
45. Orange	Orange	Tillery-Ryan	Chesson 1	6,040	Oil	Frio	New reservoir
46. Livingston	Polk	Humble	Granbury 52	4,017	Oil	Yegua	New reservoir
47. Cold Spring	San Jacinto	Butcher-Arthur	Foster Lumber B-2	4,437	Gas	Yegua	New reservoir
48. Evergreen	San Jacinto	Mac Drilling	Payne 1 (workover)	4,596	Oil	Yegua	New sand
49. Evergreen	San Jacinto	Mac Drilling	Payne 1 (workover)	7,596	Gas-Condensate	Wilcox	New sand
50. Glendale	Trinity	Magnolia	Bolton 3	9,990	Gas-Condensate	Woodbine	New sand
51. Katy	Waller	Humble	K. G. U. II, No. 28	7,148	Gas and Oil	Yegua	Extension 2,000' north
52. Bernard, West	Wharton	Tide Water	Stephen 1	7,608	Gas-Condensate	Yegua	New sand
53. Hutchins	Wharton	McDannald	Appling 2	3,116	Gas	Miocene	New sand
54. Hutchins, South	Wharton	McDannald	Martin 2	5,736	Oil	Frio	New sand
55. El Campo	Wharton	Seaboard	Holub 1-B	6,100	Gas	Frio	New sand
56. Louise	Wharton	Franklin	Brown 1	6,324	Gas	Frio	New sand
57. Prasifka	Wharton	Cockburn	Blauvelt 1	4,214	Gas	Miocene	New sand
58. Twin Basin	Wharton	Karsten	Danielson 1	6,742	Gas	Frio	New sand
59. Boling	Wharton	Hagen	Mick, 1	5,066	Oil	Frio	New reservoir
60. Pickett Ridge	Wharton	Moore	Wilbeck 2	4,616	Oil	Frio	New sand
61. El Campo, South	Wharton	Karsten	Beal 1	5,564	Oil	Frio	New sand

covery of the year, the Bernard, West, gas-condensate field in Wharton County. The Wilcox lost ground while the Miocene gained slightly. There were no new discoveries in the Cretaceous in 1947.

New sands were found in 9 of the new fields during 1947 (Fig. 1 and Table III).

Of the 21 new discoveries, 9, or 43 per cent, are credited to a combination of geophysics and subsurface geology, 6, or 29 per cent, to geophysics, 4, or 19 per cent, to subsurface geology, and 2, or 9 per cent, to trend and random drilling.

The new oil discoveries, as a group, are particularly unimpressive and only three of them, all Frio fields, are likely to produce more than a million barrels of oil. These are: Hutchins, South; Gist; and Jergins.

The Hutchins, South, field, Wharton County, is probably the most important. It is located on the flank of a broad regional nose and produces from four thin lenticular sands in the Frio at depths ranging from 4,100 to 5,900 feet. At the end of the year six oil wells and one gas well had been completed.

The Gist field, Newton County, is a small closure which is probably on the downthrown side of a small strike fault. Two sands in the Frio were proved for production during the year at depths of 5,600 and 5,750 feet. Two oil wells had been completed and a third was in the process of completion in a sand in the basal Frio marine section or "Hackberry" at 7,200 feet as the year ended.

The Jergins field, Chambers County, is a small closure on the high side of a 500-foot up-to-the-coast fault and may be structurally related to the Cedar Bayou feature located one mile north. The discovery well was a high gas-oil ratio producer in the top sand member of the *Marginulina*-Frio section at 6,316 feet. Subsequent completions have been made in a reservoir about 100 feet lower and have resulted in good oil wells. At the close of the year four oil wells had been completed in addition to the discovery well.

With a rapidly lengthening list of successful gas-cycling plants to its credit and with increasing demands for fuel gas, the Upper Gulf Coast district was definitely endeavoring to find new reserves of this type in 1947. Significantly, more gas and gas-condensate fields were discovered than oil fields (11 to 10), and the most important new discovery for the year, Bernard, West, in Wharton County, is of this type. At least four of the new fields, all gas-condensate producers, will exceed 10 billion cubic feet of gas in reserve, and are described in the following paragraphs.

The Bernard, West, field, Wharton County, is a medium-sized domal uplift along the multiple-sand trend of the Yegua. Six sands between the depths of 6,700 and 7,900 feet are proved either by production or drillstem test. Three wells had been completed at the close of 1947.

The Vidor, North, field, Orange County, is a small elliptical closure on the downthrown side of a strike fault. The discovery sand at 7,800 feet is in the basal Frio marine section or "Hackberry." A second well, which concluded development for the year, was completed in a lenticular Frio sand at 6,950 feet which was not present in the discovery well.

The Clodine, West, field was the only discovery in Fort Bend County during 1947. It is a small closure on the downthrown side of a 110-foot down-to-the coast fault. The discovery well was the only completion for the year and is dually producing from Yegua sands at 7,250 and 7,400 feet. One other Yegua sand was tested for gas-condensate production.

The San Jacinto field, Harris County, is a small closure on the upthrown side of a 50-foot fault. This small feature is on the crest of a large, low-relief structure east of the Humble piercement salt dome. Two sands at 7,800 feet and 8,350 feet in the Yegua are proved for production. Three wells had been completed at the close of 1947.

DEVELOPMENT IN OLD FIELDS

An idea of the importance of development in old fields may be gained from the various estimates on additions to reserves in the district which show that from six to ten times as much oil and about twice as much gas were added from this source as from all of the new fields combined.

As shown in Table I, drilling of field wells, including field wildcats, increased 26.5 per cent in 1947 over the previous year. This drilling was also more successful in 1947, the dry-hole percentage being 23.7 as compared with 26.5 in 1946.

The most active field in the district was Sugar Valley, a deep-seated dome in Matagorda County with 38 completions, followed by Saratoga with 29, and Sour Lake with 28. The latter two fields are piercement salt domes both in Hardin County.

Although field development in the district was active on all types of structures, drilling was more concentrated on the old piercement salt domes than in the past and these efforts met with gratifying success. Drilling statistics show that of the 20 fields which led in development, 10 were piercement salt domes with a total of 171 completions as compared with only 130 completions in the 10 fields leading in development on structures of other types. Much of this successful development can be attributed to reexamination of old geological data and careful subsurface work.

Old fields, in which new sands (new producing zones), new reservoirs (in the same zone), or extensions (in the same zone) were discovered during 1947, are shown in Figure 1 and Table III. These include 51 developments classified as follows: 29 new sands, 15 new reservoirs, and 7 extensions.

The most important old field development, and probably the most important development of the year including new-field discoveries, was the discovery at Sugar Valley in Matagorda County of several new sands in the lower Frio southeast of a down-to-the-coast fault. Five oil wells had been completed in the newly discovered Truitt sand at the end of the year and development was continuing.

Other important developments, each of which added more than a million barrels of oil to existing reserves, were as follows: a new deeper Frio sand reservoir on the north flank of West Columbia piercement salt dome in Brazoria County;

a 2,000-foot north extension to existing deep Frio producing sands at Fisher's Reef in Galveston Bay of Chambers County; a one-mile southwest extension to existing Yegua production in the North Cleveland field in Liberty County; and a new producing reservoir in the regular Yegua producing sand in the Livingston field of Polk County.

Worthwhile additions to gas and condensate reserves were made in Colorado County where new sands were found at Columbus, Frelsburg, and Nada; and in Wharton County, at Louise and El Campo.

EXPLORATORY METHODS AND RESULTS

Geophysical work continued to lead in finding new fields in the district. Seismograph exploration increased slightly over 1946 with an average of 31 crews active in 1947 as compared with 29 during the previous year. Gravity work increased from an average of 4 crews to an average of 9 crews. The area of most active exploration was along the lower coast with the most interest centering in Matagorda County. There was also considerable activity along the Yegua and Wilcox trends from Colorado County to Newton County, on the Louisiana line. Work along the Continental Shelf was started by a few companies and will probably expand if State regulations permit. Some of the older structures were being detailed by reflection seismograph with the hope of finding new fault segments.

Subsurface work was becoming of increasing importance and was undoubtedly largely responsible for the fine record of new sands, new reservoirs, and extensions found during 1947.

A small amount of surface geological mapping was still being done along the northern border of the district.

MISCELLANEOUS DEVELOPMENTS

A new interior piercement salt dome was discovered in central Madison County where the presence of this type of structure had been suspected for some time as a result of surface and core-drill work. Two wells were drilled during the year, the first encountering cap-rock from 2,780 to 3,065 feet, and the second topping salt at 3,167 feet. Both wells encountered numerous oil-stained sands in the Wilcox, but all tests showed salt water.

The first Woodbine (Upper Cretaceous) sand production for the district was established in the Glendale field of Trinity County with the completion of a small gas well at a depth of 9,932 feet. The trend will be limited to the extreme north part of the district.

PRODUCTION

Oil production in 1947 amounted to 191,166,000 barrels, up 6 per cent over 1946 and setting an all time record except for the war year, 1944, when production was slightly greater.

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VOL. 32, NO. 6 (JUNE, 1948), PP. 1032-1039, 1 FIG., 4 TABLES

DEVELOPMENTS IN LOUISIANA GULF COAST IN 1947[1]

WENZEL B. NEILL[2]
Lake Charles, Louisiana

ABSTRACT

In 1947, 646 wells of all classifications were drilled in the Louisiana Gulf Coast. Of this number, 166, or 25.7 per cent, were classified as exploratory wells and 480, or 74.3 per cent, as field-development wells.

Of the 166 exploratory wells, 59, or 35.5 per cent, were successful. Their classification follows.

	Success Percentage
New-Field Wildcats, 73	17.8
New-Pool Wildcats, 39	64.8
Shallower-Pool Tests, 7	85.7
Deeper-Pool Tests, 7	100
Outposts, 40	20

Among the 480 development wells, 395, or 82.3 per cent, were successful and 85 were failures.

There was a 10 per cent increase in drilling in 1947, with 646 wells drilled, as compared with 586 in 1946. These figures include only new holes drilled and do not include work-overs that were completed in shallower sands.

The 13 new-field discoveries include 7 oil fields, 2 gas-distillate fields and 4 gas fields. Only 2 of these fields, Holmwood, a faulted structure and Ship Shoal-Block 32, a new offshore salt dome, are considered at this stage of development to be of significance.

Ten of the new-field discoveries were credited to seismic surveys and 3 to seismic and subsurface.

Several dry holes added knowledge of stratigraphy. Two of these failed in attempts to extend regionally westward, the producing Massive Tuscaloosa sand of the Big Island field. One shallow dry hole located a piercement-type salt dome in the Gulf of Mexico.

Seismograph operations continued at a steady pace throughout the year with an approximate total of 3,400 crew weeks reported. Most of these operations was along the coastal and offshore Miocene trend.

Leasing continued at a high level. Approximately 3,000,000 acres were taken, the majority of which was along the coastal and offshore Miocene trend.

Drilling continued at a stepped-up pace with most of it confined to intermediate and deep Miocene horizons.

The trend of exploration was definitely along the Miocene belt which has offered, and still offers, unlimited prospective sands and promise of greatest returns.

DEVELOPMENT

The Louisiana Gulf Coast district which includes 38 parishes in south and central Louisiana (Fig. 1), was a very active area during 1947. There was a total of 646 wells of all classifications drilled, as compared with 586 in 1946, an increase of 10 per cent. These figures include only new holes drilled and do not include work-overs that were completed in shallower sands. Of the total wells drilled, 480, or 74.3 per cent, were classified as development wells, and 166, or 25.7 per cent, were classified as exploratory wells. Among the development wells, 395, or 82.3 per cent, were successful and 85 were failures. Among the exploratory wells 59, or 35.5 per cent were successful and 107 were failures. A numerical break-down

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[2] Stanolind Oil and Gas Company. The writer acknowledges with thanks the help and criticism of his associates in the South Louisiana Geological Society and his indebtedness to the committee on statistics of exploratory drilling for information furnished.

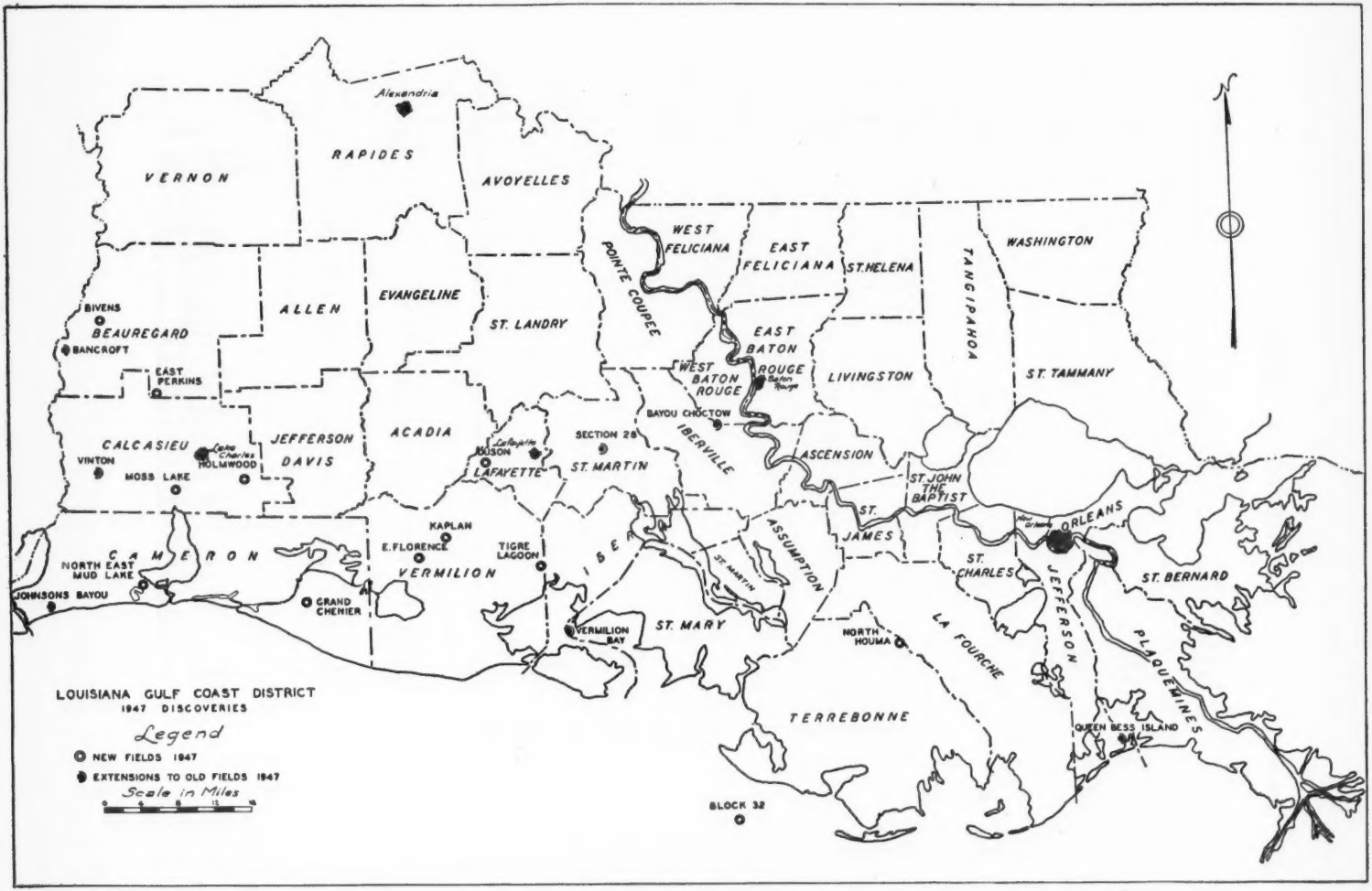

FIG. 1.—Louisiana Gulf Coast district, 1947 discoveries.

TABLE I

Summary of Operations in Louisiana Gulf Coast in 1947

Parish	Total Wells Drilled	Total Exploratory Wells	Total Successful	Exploratory Wells			Total Unsuccessful	Total Development	Total Successful	Development Wells			Total Unsuccessful
				Number Oil	Number Gas-Dist.	Number Gas				Number Oil	Number Gas-Dist.	Number Gas	
Acadia	61	8	2	1			6	53	48	41	6	1	5
Allen	1	1	0				1	0					
Ascension	3	1	0				1	2	0				2
Assumption	7	3	1				2	4	1	1			3
Avoyelles	5	4	1	1			3	1	1	1			0
Beauregard	34	9	4	3	1		5	25	19	19			6
Calcasieu	41	11	5	3	2		6	30	27	21	2		3
Cameron	30	7	6	1	2		1	23	18	16	1		5
East Baton Rouge	6	0	0				0	6	6	6			0
East Feliciana	1	1	0				1	0	0				0
Evangeline	18	4	0				4	14	12	7	1		2
Iberia	29	13	5	4		1	8	16	10	10			6
Iberville	30	5	1		1		4	25	20	16	4		5
Jefferson	31	7	5	3	1	1	2	24	21	21			3
Jefferson Davis	28	7	1			1	6	21	17	12	2		4
Lafayette	5	4	1			1	3	1	1	1			0
Lafourche	63	9	5		1		4	54	48	45	2		6
Livingston	0	0	0				0	0	0				0
Orleans	0	0	0				0	0	0				0
Plaquemines	55	10	5		2		5	45	41	40	1		4
Pointe Coupee	0	0	0				0	0	0				0
Rapides	9	3	0				3	6	4				2
St. Bernard	2	2	0				2	0	0				0
St. Charles	21	7	2	2			5	14	11	10			3
St. Helena	1	1	0				1	0	0				0
St. James	3	0	0				0	3	1	1			2
St. John	1	1	0				1	0	0				0
St. Landry	27	4	1				3	23	19	18		1	4
St. Martin	31	7	2				5	24	19	18		1	5
St. Mary	35	13	4				9	22	18	14		4	4
St. Tammany	0	0	0				0	0	0				0
Tangipahoa	0	0	0				0	0	0				0
Terrebonne	48	14	5			1	9	34	23	25	1	2	6
Vermilion	16	6	3			1	3	10	5	3	1	1	5
Vernon	1	1	0				1	0	0				0
Washington	0	0	0				0	0	0				0
West Baton Rouge	2	2	0				2	0	0				0
West Feliciana	1	1	0				1	0	0				0
Totals	646	166	59	35	12	12	107	480	395	350	21	24	85

by parishes, of the exploratory and development wells, their success or failure, and type of completion is shown by Table I.

A very careful attempt was made to classify all wells drilled according to the classification as set out by the committee on statistics of exploratory drilling. Following this classification, the exploratory wells were classified as follows: 73 were new-field wildcats of which 13, or 17.8 per cent, were successful and 60 were failures; 39 were new-pool wildcats, of which 25, or 64.1 per cent, were successful and 14 were failures; 7 were shallower-pool tests, of which 6, or 85.8 per cent, were successful and 1 was a failure; 7 were new deeper-pool tests, of which 7, or 100 per cent, were successful and none was a failure; and 40 were outposts, of which 8, or 20 per cent, were successful and 32 were failures.

The classification of the exploratory wells, as set out, does not agree exactly with the classification as furnished for comparison by the committee on statistics of exploratory drilling. The chief discrepancies are probably due to the differences of opinion that arise (1) as to what constitutes an exploratory well on highly complex piercement-type salt domes and much faulted deep-seated structures, and (2) into what classification such a well should be placed. The problem of classification is further complicated by the numerous, potentially productive sands on and around such structures.

Production was definitely on the up-grade in the Louisiana Gulf Coast, with 129,767,329 barrels of oil produced in 1947, as compared with 118,871,519 barrels produced in 1946.

NEW FIELDS DISCOVERED

The new field discoveries are shown in Figure 1 and are listed in Table II with pertinent data.

The success percentage of 17.8 per cent of the total new-field wildcats is impressive, but about the normal discovery rate for this area. However, the quality of most of the new fields, with respect to their addition to future reserves, is not impressive. The one exception is the Holmwood field in Calcasieu Parish.

The Holmwood field, discovered February 7, 1947, was one of the most actively developed new fields in the area. By the end of the year, 12 wells had been drilled, of which 9 were oil wells, 1 was a gas well, and 2 were dry holes. The productive area has not yet been defined on the east. Its structure, as revealed by present control, is caused by reversal into a regional strike fault. It is the consensus that the oil reserves of this field are not of major proportions. However, the potential gas reserves of the thick deeper sand, considerably augments the importance of this discovery.

The discovery of Ship Shoal-Block 32, as a shallow productive piercement-type salt dome marks the first successful venture in the Gulf of Mexico. At the end of the year it was a one well field and its full potentialities were unknown due to lack of additional development. The East Florence field, Vermilion Parish, was

TABLE II

FIELDS DISCOVERED IN LOUISIANA GULF COAST IN 1947

Field	*Parish*	*Operator*	*Discovery Well*	*Completion Date*	*Producing Formation*	*Depth to Production (Feet)*	*Initial Production*	*Method of Locating Discovery Well*
1. Bivens	Beauregard	Atlantic	Newport Industries 1	5-17-47	Cockfield	7,272	113 bbls. oil; 6/64″ ch.; Gr. 41.1°; R 513-1	Seismic
2. East Perkins	Beauregard	Union Sulphur	McFatter 1	7-30-47	Oligocene*	6,498	130 bbls. oil; 7/64″ ch.; Gr. 29.5°; R 1,332-1	Seismic & Subsur.
3. Holmwood	Calcasieu	Sohio	Farmers Ld. & Canal 2	2- 7-47	Oligocene	10,370	291.6 bbls. oil; 10/64″ ch.; Gr. 37.5° R 676-1	Seismic
4. Moss Lake	Calcasieu	Sun	La. Farm & Livestock 1	7-19-47	Oligocene	8,844	136 bbls. oil; 7.1% BS&W; 1/8″ ch.; Gr. 37.5°; R 3,566-1	Seismic & Subsur.
5. Northeast Mud Lake	Cameron	Magnolia	Lutcher C-1	3-28-47	Miocene	10,750	43 bbls. dist.; 3,750 MCF gas; 12/64″ ch.; Gr. 43.3°; R 88, 300-1	Seismic
6. East Cameron	Cameron	Texas	Miami Corp. Fee 4	10-28-47	Miocene	4,492	237 bbls. fluid 99.5% S.W. 192 MCF Gas 11/64″ ch. (Temporarily abandoned)	Seismic & Subsur.
7. Grand Chenier	Cameron	Sohio	Richard 1	3-11-47	Miocene	8,380	1,931 MCF Gas; 10/64″ ch.	Seismic
8. Duson	Lafayette	Union Sulphur	Harson Unit 1-A	5-22-47	Oligocene	10,840	18 bbls. dist.; 11/64″ ch.; Gr. 46.3°; R 95,000-1	Seismic
9. North Houma	Terrebonne	Union of Calif.	Dupont 1	7- 2-47	Miocene	11,940	6,400 MCF Gas; 130 bbl. dist.; 16/64″ ch.; Gr. 50.1°; R 49,150-1	Seismic
10. Ship Shoal-Block 32	Terrebonne	Kerr-McGee	State 1	11-14-47	Pliocene	1,734	600 bbls. oil; 1/2″ ch.; Gr. 24.9°; R-Low. (New salt dome)	Seismic
11. Kaplan	Vermilion	Humble	Romaine, et al. 1	1- 9-47	Miocene	11,060	64 bbls. oil; 1/4″ ch.; Gr. 31.2°; R 183-1 (Abandoned Sept. 1947)	Seismic
12. East Florence	Vermilion	Stanolind	Watkins 1	10- 8-47	Miocene	7,070	114 bbls. oil; 33.6 MCF Gas; 6/64″ ch.; Gr. 56°; R 320-1	Seismic
13. Tigre Lagoon	Vermilion	Union Oil of Calif.	Landry 1	5-20-47	Miocene	11,480	2,016 MCF Gas; 10/64″ ch.	Seismic

Abbreviations: 1/4″ ch., 1/4 inch choke; Gr., gravity; R, gas-oil ratio.
* An arbitrary distinction is made between Miocene and Oligocene. The top of the Oligocene is interpreted as the top of the *Discorbis* or *Heterostegina* zone.

TABLE III

IMPORTANT NEW POOLS (NEW SANDS) IN LOUISIANA GULF COAST IN 1947

Field	*Parish*	*Operator*	*Well*	*Depth to Production (Feet)*	*Type*	*Producing Formation*
1. Iota	Acadia	Crown-Central	Duson 1	8,814	Oil	Oligocene
2. Dave Haas	Avoyelles	Atlantic	Haas Investment Co. 1	8,562	Oil	Wilcox
3. Iowa	Calcasieu	Magnolia	Wait 20	9,472	Gas-Distillate	Oligocene[1]
4. Holmwood	Calcasieu	Sohio	Farmers Mallet Unit 1	10,820	Gas-Distillate	Oligocene
5. Cameron Meadows	Cameron	Magnolia-Humble	Cameron Meadows 1	8,678	Gas-Distillate	Miocene
6. Weeks Island	Iberia	Humble	Burguierres B-3	11,662	Oil	Miocene[2]
7. Weeks Island	Iberia	Shell	Myles Salt 1	12,408	Oil	Miocene
8. Weeks Island	Iberia	Shell	State 2	9,250	Oil	Miocene
9. West Barataria	Jefferson	California	Rathborne Ld. Lse. 4 Well 1	8,930	Oil	Miocene
10. South Barataria	Jefferson	California	Brady Lse. 1 Well 9	11,821	Gas-Distillate	Miocene
11. Bay de Chene	Jefferson	Texas	Lafourche B. L. D. C-1	10,768	Oil	Miocene
12. Bayou des Allemands	Lafourche	Amerada	Gheens 13	8,408	Oil	Miocene
13. Bully Camp	Lafourche	Gulf	Delta Securities 17	7,035	Oil	Miocene
14. Leeville	Lafourche	Texas	Barrow 1	9,680	Oil	Miocene
15. Leeville	Lafourche	Texas	L. L. & E. 103	10,535	Oil	Miocene
16. Valentine	Lafourche	J. W. Brown	Dousson 3	9,755	Gas-Distillate	Miocene
17. Garden Island Bay	Plaquemines	Texas	State 76	8,960	Oil	Miocene
18. Lake Hermitage	Plaquemines	Gulf	Lafourche B. L. D. 17	11,895	Gas-Distillate	Miocene
19. Quarantine Bay	Plaquemines	Gulf	State QQ 55	9,746	Gas-Distillate	Miocene
20. Quarantine Day	Plaquemines	Gulf	State QQ 56	9,946	Oil	Miocene
21. Quarantine Bay	Plaquemines	Gulf	State QQ 58	10,505	Oil	Miocene
22. Bayou Couba	St. Charles	Gulf	Delta Securities 21	6,250	Oil	Miocene
23. Good Hope	St. Charles	Humble	Sarpy 12	9,238	Oil	Miocene
24. South Jeanerette	St. Mary	Atlantic	Adeline Sugar B-1	7,160	Oil	Miocene
25. Cote Blanche Bay	St. Mary	Texas	State 27	10,916	Gas	Miocene
26. Four Isle	Terrebonne	Superior	L. L. & E. Unit 12 Well 2	13,455	Gas-Distillate	Miocene
27. Four Isle	Terrebonne	Superior	L. L. & E. 3	8,978	Oil	Miocene
28. Dog Lake	Terrebonne	Texas	State Unit 18 Well 1	7,967	Oil	Miocene

[1] First salt in Iowa field.
[2] First production on south flank.

TABLE IV

IMPORTANT (OUTPOSTS) EXTENSIONS IN LOUISIANA GULF COAST IN 1947

Field	*Parish*	*Operator*	*Well*	*Depth to Production (Feet)*	*Type*	*Producing Formation*	*Remarks*
1. Bancroft	Beauregard	Vincent-Welch	Houston Oil 1	7,899	Gas-Dist.	Cockfield	4,300-foot E. extension
2. Vinton	Calcasieu	Union Sulphur	Clear Land & Development 1	6,139	Oil	Oligocene	2,050-foot E. extension
3. Johnson's Bayou	Cameron	Stanolind	McManus 1	4,480	Gas	Miocene	7,150-foot SW. extension
4. Vermilion Bay	Iberia	Texas	State B-10	9,840	Gas	Miocene	1¼-mile NE. extension
5. Queen Bess Island	Jefferson	Texas	Lafourche B. L. D. 1	13,887	Gas	Miocene	1-mile SW. extension
6. Section 28	St. Martin	Gulf	Rycade 1	10,546	Oil	Oligocene	½-mile SE. extension

likewise a one-well field at the end of the year. It holds promise, by virtue of later developments, of being a structure of major size.

Two of the discoveries listed in Table II were not producing at the end of the year. The discovery well for Kaplan, Vermilion Parish, was abandoned in September. The East Cameron discovery was temporarily abandoned immediately after testing. It is not shown on Figure 1.

NEW SANDS AND EXTENSIONS

A list of the important new pools, or new sands, discovered in known fields is shown in Table III. In Table IV are listed the important extensions to old fields which are also located in Figure 1.

West Barataria, Jefferson Parish, is considered to be an important new-pool discovery because of the large indicated potential reserves. At the end of the year there were 17 successfully completed oil wells and no dry holes. Included in these completions were two new shallower-sand discoveries. Some reports list Barataria as a new-field discovery but it appears at this stage of development to be an upthrown fault segment on the large Barataria structure.

The Dave Haas new-pool discovery, Avoyelles Parish, from a structural standpoint, is similar to West Barataria. It, likewise, is an upthrown fault segment on the southwest flank of the Eola structure. Only two wells were completed by the end of the year.

No appreciable reserves can be credited to the extensions listed. Of general interest, among the outpost wells, is The Texas Company's Lafourche Levee Basin District No. 1, Queen Bess Island field, Jefferson Parish. In addition to being a 1-mile southwest extension of this field, it is the deepest producer in the world.

GENERAL

There were several interesting dry wildcats completed during the year that added some knowledge of stratigraphy. The Burton's Bently Lumber Company No. 1 in the Flatwoods area, Rapides Parish, and the Humble's Anderson Post Lumber Company No. 1, Hawthorne area, Vernon Parish, failed in attempts to extend regionally westward the Massive Tuscaloosa sand, which produces in the Big Island field, Rapides Parish. There were several deep tests, located along the coastal and offshore Miocene trend, that contributed some knowledge. One shallow test, the Magnolia's well No. 1, Eugene Island area, Block 94, discovered a new, offshore, piercement salt dome.

The statistical data on exploratory wells show a distinct trend toward an evaluation of new-pool possibilities, on, and flanking proved and unproved structural features. These data also show a continued trend toward deeper drilling, especially along the coastal and offshore Miocene belt, which has and still offers promise of greatest returns.

The seismograph continues to be the principal geophysical exploratory instrument in the Louisiana Gulf Coast, as shown by the following tabulation.

GEOPHYSICAL OPERATIONS

Month	*Number of Crews*		
	Seismograph	*Gravitimeter*	*Others*
January	60	19	(None reported)
February	62	22	
March	61	22	
April	61	21	
May	63	21	
June	63	22	
July	63	22	
August	63	21	
September	58	19	
October	58	17	
November	62	15	
December	61	14	
Average per month during 1947	61	20	

Seismograph operations maintained a steady pace with no appreciable fluctuation throughout the year. An approximate total of 3,400 crew weeks was reported. Most of these operations was along the coastal and offshore Miocene trend.

Leasing continued in 1947 at a high level. Approximately 3,000,000 acres were taken, most of which was along the coastal and offshore Miocene trend.

There are many unsolved old and new problems related to stratigraphy and nomenclature in the Louisiana Gulf Coast. The principal unsolved problem is related to the difficulty in correlating and zoning the thick Miocene and younger sediments which constitute the extensive delta complex. The offshore drilling further complicates the matter by presenting new problems in stratigraphy before any satisfactory solution of the old is evolved. A detailed study of the available samples, from an ecologic and petrographic standpoint, and a close correlation of such data with the electrical logs, are necessary before any degree of solution can be expected.

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DEVELOPMENTS IN ARKANSAS AND NORTH LOUISIANA IN 1947[1]

JOHN R. WILLIAMS[2]
Shreveport, Louisiana

ABSTRACT

In 1947, 1,343 wells were drilled. The 1946 total was 1,000 wells. Drilling activity in the two states thus increased by 34 per cent. Two hundred and thirty-seven wildcat wells were drilled; of this number, 76 were drilled in Arkansas and 161 in North Louisiana. In 1946, 172 wildcats were drilled, of which 55 were in Arkansas and 117 in North Louisiana. Wildcatting activity in 1947 increased 37 per cent over 1946.

In Arkansas 4 new oil fields were discovered. In addition 1 new distillate field, 11 new oil zones in old fields, and 2 new distillate zones in old fields were found. There were no new gas fields. In North Louisiana 5 new oil fields, 4 new gas fields, and 2 new distillate fields were discovered. Four new oil zones in old fields, 1 new gas zone in an old field, and 1 new distillate zone in an old field were found in North Louisiana. New fields and new pay zones totaled 35 for the area. This is comparable with 26 in 1946.

Oil production in Arkansas and North Louisiana totaled 69,207,010 barrels, an increase of 7,564,868 barrels over 1946.

Geophysical activity in Arkansas totaled 705 crew weeks, with the seismograph contributing 368 weeks and the gravity meter 188 weeks. In North Louisiana crew weeks totaled 1,281 with 718 weeks of seismic exploration and 510 weeks of gravity-meter exploration. Total crew weeks for both states in 1947 was 1,986. The 1946 total was 2,249.

INTRODUCTION

The area covered by this paper is the same as last year. This includes the entire state of Arkansas and Louisiana north of the southern parish lines of Sabine, Grant, and Concordia parishes; 25 Louisiana parishes lie north of this boundary.

DEVELOPMENT

In spite of the general shortage of pipe, drilling activity in the area increased from 1,000 wells in 1946 to 1,343 wells in 1947. This is an increase of 34 per cent. In 1945, 692 wells were drilled. In 2 years the number of wells drilled has nearly doubled.

In 1947, 76 wildcat wells were drilled in Arkansas and 161 in North Louisiana. This total of 237 wells represents an increase in wildcatting activity of 37 per cent over 1946. In 1946, 172 wildcats were drilled, of which 55 were in Arkansas and 117 in North Louisiana.

Wells drilled in Arkansas increased from 198 to 343 as indicated by Table I. The 1947 total is the largest since 1928. The footage drilled was also substantially increased. North Louisiana increased in total wells from 802 to 1,000 but footage decreased by 226,258 feet. This was due to a decrease in average depth per well by increased drilling in shallow fields such as Caddo and Ora. The over-all footage for both states was greater by 468,695 feet.

[1] Manuscript received, March 30, 1948. Presented by title before the Association at Denver, April 26–29, 1948.

[2] The Texas Company.

Table II classifies the new field discoveries and new pay zones in previously discovered fields for the year. In Arkansas 5 new fields were discovered and 13 new pay zones were added in existing fields. In North Louisiana 11 new fields were discovered. Six new producing zones were found in old fields. There were

TABLE I

NUMBER OF WELLS AND TOTAL FEET DRILLED IN 1947

	Arkansas		*North Louisiana*		*Total*	
	No.	*Feet*	*No.*	*Feet*	*No.*	*Feet*
Oil wells	180	734,254	580	1,227,687	760	1,961,941
Gas and distillate wells	19	90,341	125	577,086	144	667,427
Dry holes—fields	68	353,098	134	422,498	202	775,596
Dry holes—wildcats	76	326,260	161	732,977	237	1,059,237
Total	343	1,503,953	1,000	2,960,248	1,343	4,464,201

TABLE II

CLASSIFICATION OF 1947 DISCOVERIES IN ARKANSAS AND NORTH LOUISIANA

State	*New Oil Field*	*New Gas Field*	*New Distillate Field*	*New Oil Producing Zone in Old Field*	*New Gas Producing Zone in Old Field*	*New Distillate Producing Zone in Old Field*
Arkansas	4	0	1	11	0	2
North Louisiana	5	4	2	4	1	1
Total	9	4	3	15	1	3

TABLE III

BARRELS OF OIL PRODUCED

State	*1945*	*1946*	*1947*
Arkansas	28,547,400	28,364,872	29,770,000
North Louisiana	25,722,270	33,277,270	39,437,010
Total	54,269,670	61,642,142	69,207,010

35 new discoveries in the area as compared with 26 in 1946. The 16 new fields discovered is 3 more than in 1946.

Table III lists the gross oil production for 1947 and for the 2 preceding years. Production in 1947 was 7,564,868 barrels greater than in 1946.

The daily average production on January 1, 1947, was 79,000 barrels in Arkansas and 100,000 barrels in North Louisiana. By the end of the year Arkansas was producing 87,500 barrels daily and North Louisiana 120,200 barrels.

Tables IV–VII classify all wells drilled in the area in 1947 by counties and parishes and list the total footage drilled.

In Arkansas, as shown by Table IV, 80 per cent of the producing wells were drilled in Ouachita, Columbia, and Lafayette counties. In 1946 these counties accounted for 77 per cent of the total. In Lafayette County the most active field was Spirit Lake with 15 producing wells drilled during the year. In Columbia County the Buckner field with 15 producers and the Village field with 19 successful completions accounted for most of the oil wells drilled. In Ouachita County the Wesson field experienced a considerable drilling boom and had 66 new producing wells and 20 dry holes. In the Pace City field of Ouachita County 13 producing wells were completed.

TABLE IV

PRODUCING WELLS COMPLETED IN ARKANSAS IN 1947

County	*Oil Wells*	*Feet Drilled*	*Gas and Distillate Wells*	*Feet Drilled*	*Total Producing Wells Drilled*	*Total Footage—Producing Wells*
Calhoun	1	2,048			1	2,048
Columbia	38	235,543	6	44,634	44	280,177
Franklin			3	11,231	3	11,231
Lafayette	25	143,064	2	13,288	27	156,352
Miller	6	24,571	1	7,505	7	32,076
Nevada	9	18,832			9	18,832
Ouachita	86	264,313	1	1,538	87	265,851
Sebastian			4	9,875	4	9,875
Union	15	45,883	2	2,270	17	48,153
Total	180	734,254	19	90,371	199	824,595

As shown by Table V the greatest number of producing wells in Louisiana were added in Caddo, Union, Richland, and Bossier parishes. Of the 306 producing wells in Caddo Parish, 256 were from the shallow (1,500 feet) Annona chalk zone. Nearly all of these wells were within 2 or 3 miles of Oil City, Louisiana (Sec. 1, T. 20 N., R. 16 W.). In 1946 only 73 producing chalk wells were completed.

In Union Parish, the Ora field discovered in June, 1947, had 108 oil completions from the Nacatoch by the end of the year. The Monroe gas field had 63 "Monroe gas rock" gas wells finaled during the year. In the Delhi field in Richland and Madison parishes 49 oil wells and 3 gas wells were completed in 1947. This is a sharp drop from the 200 oil wells and 21 gas wells completed in 1946.

In Bossier Parish 34 oil wells and 3 gas wells were completed in the Bellevue field. Two of these were from the Tuscaloosa and the remainder from the Nacatoch (average depth 300–400 feet). This field was discovered in the early 1920's and abandoned during the depression. Much redrilling has taken place since 1933.

There was a striking increase in shallow completions in old fields such as

TABLE V

PRODUCING WELLS COMPLETED IN NORTH LOUISIANA IN 1947

Parish	*Oil Wells*	*Feet Drilled*	*Gas and Distillate Wells*	*Feet Drilled*	*Total Producing Wells Drilled*	*Total Footage—Producing Wells*
Bienville			5	37,663	5	37,663
Bossier	35	25,458	7	27,620	42	53,058
Caldwell			1	9,911	1	9,911
Catahoula	1	9,471			1	9,471
Caddo	302	490,151	4	24,337	306	514,488
Claiborne	12	67,357	12	101,346	24	168,703
Concordia	6	41,054	6	55,118	12	96,172
De Soto	2	11,174	6	35,724	8	46,898
Franklin	4	14,009	4	27,813	8	41,822
Grant	1	1,597			1	1,597
Jackson			1	12,317	1	12,317
La Salle	26	48,865			26	48,865
Lincoln			3	26,232	3	26,232
Madison	6	20,238	1	6,130	7	26,368
Natchitoches	3	12,182			3	12,182
Ouachita			1	4,106	1	4,106
Red River	3	12,633			3	12,633
Richland	43	138,041	5	16,987	48	155,028
Sabine	15	30,461			15	30,461
Tensas	4	30,008	2	17,496	6	47,504
Union	110	239,699	63	145,174	173	384,873
Webster	7	35,289	4	29,112	11	64,401
Total	580	1,227,687	125	577,086	705	1,804,773

TABLE VI

DRY HOLES DRILLED IN FIELDS, 1947

County or Parish	*No.*	*Feet Drilled*	*County or Parish*	*No.*	*Feet Drilled*
ARKANSAS					
Columbia	10	135,848	Ouachita	26	84,206
Franklin	1	3,508	Sebastian	2	5,146
Lafayette	10	60,733	Union	6	18,469
Miller	7	30,933			
Nevada	6	14,255	Total	68	353,098
NORTH LOUISIANA					
Bienville	3	22,669	Madison	3	10,745
Bossier	7	16,649	Natchitoches	1	3,366
Catahoula	2	15,069	Red River	1	2,711
Caddo	28	59,807	Richland	15	50,838
Claiborne	5	22,370	Sabine	7	17,767
De Soto	4	13,007	Union	25	53,647
East Carroll	1	2,734	Webster	10	54,120
Franklin	13	53,597	Winn	1	1,503
La Salle	7	13,101			
Lincoln	1	8,800	Total	134	422,498

Caddo, Bellevue, and Urania (La Salle Parish) during 1947. This is undoubtedly due to the prevailing high price of crude. Stripper operations have become increasingly profitable.

Three new interior salt domes were discovered by exploratory drilling during 1947. In Catahoula Parish, Louisiana, the Pan American's L. R. McGraw No. 1, Sec. 24, T. 10 N., R. 8 E., encountered domal cap rock at 5,896 feet and salt

TABLE VII

WILDCAT DRY HOLES, 1947

County or Parish	*No.*	*Feet Drilled*	*County or Parish*	*No.*	*Feet Drilled*
		ARKANSAS			
Arkansas	2	7,364	Lafayette	11	55,709
Ashley	7	25,477	Little River	4	12,312
Bradley	1	4,504	Logan	1	4,780
Calhoun	2	6,165	Lonoke	1	635
Chicot	1	4,830	Miller	5	23,128
Clark	1	1,054	Nevada	4	16,520
Columbia	5	42,325	Ouachita	5	13,754
Desha	2	9,545	Union	14	63,470
Drew	2	8,920			
Hempstead	6	17,971	Total	76	326,260
Jefferson	2	7,497			
		NORTH LOUISIANA			
Bienville	2	14,550	Morehouse	4	13,424
Bossier	11	37,423	Natchitoches	6	26,027
Caddo	9	34,225	Ouachita	3	15,762
Caldwell	1	6,006	Red River	3	14,524
Catahoula	3	23,679	Richland	16	55,622
Claiborne	3	21,548	Sabine	6	23,744
Concordia	2	19,810	Tensas	3	16,918
De Soto	14	67,581	Union	31	95,118
East Carroll	4	17,770	Webster	2	27,326
Franklin	11	48,251	Winn	7	38,902
Grant	3	17,986			
La Salle	4	34,862	Total	161	732,977
Madison	13	61,919			

at 5,988 feet. The well was still in salt at the total depth of 6,285 feet. Domal material penetrated into the upper Tuscaloosa on this dome. No showings were encountered in the well. This dome is not named.

In Franklin Parish, Louisiana, the Gulf's G. Washington No. 1, Sec. 11, T. 15 N., R. 8 E., was the discovery well of the Crowville salt dome. Cap rock was encountered at 572 feet. The total depth was 910 feet. This dome penetrated into the Cane River formation.

In Winn Parish, Louisiana, H. L. Hunt's Goodpine Lumber Company No. F-136, Sec. 12, T. 10 N., R. 2 W., was reported to have encountered domal ma-

terial at 6,245 feet and salt at 6,425 feet. Total depth was 6,432 feet. The dome penetrated upward into the Tuscaloosa. Two very slight gas shows were encountered in the Tuscaloosa. The name Packton has been given to this dome.

NEW DISCOVERIES

New oil fields.—Four new oil fields were discovered in Arkansas during 1947. These were Locust Bayou in Calhoun County, Mars Hill in Lafayette County, Cypress Lake in Miller County, and Sandy Bend in Union County. Sandy Bend and Mars Hill had two completions by the end of the year; the others had not been developed beyond the discovery well. Locust Bayou produces 16° gravity oil from the Meakin sandstone at the base of the Annona chalk. The Mars Hill field yields 49° gravity oil from the Smackover limestone. Cypress Lake produces 30° gravity oil from a lenticular sandstone in the upper Glen Rose, 300 feet above the Ferry Lake anhydrite. The Sandy Bend field is productive of 30° gravity oil from a sandstone in the Hosston formation. The Sandy Bend and Locust Bayou fields appear to be of minor importance. The Mars Hill field has a high initial gas-oil ratio and will probably soon be classed as a distillate field.

Five new oil fields were discovered in North Louisiana during 1947. These were the Koran field in Bossier Parish, the Jonesville field in Catahoula Parish, the Kickapoo field in De Soto Parish, an un-named new field in Red River Parish discovered by the British American's Wimberly No. 1, Sec. 2, T. 13 N., R. 10 W., and the Ora field in Union Parish. The Jonesville field produced from the basal Tuscaloosa, the Koran field pumped 45° gravity oil and salt water from the Tuscaloosa (Lewisville), the Kickapoo field yielded 46° gravity oil from a lenticular sandstone in the Paluxy, the un-named field in Red River Parish pumped a small amount of 42° gravity oil and a considerable volume of salt water. The Ora field produces 29.4° oil from the Nacatoch sandstone. The Jonesville field was abandoned by the end of the year. An active gas seep in the Black River ¼ mile north of the discovery well of the Jonesville field has long been recognized. Koran, Kickapoo, and the new field in Red River Parish had only 1 completion at the end of the year. The Ora field, which was the only important oil discovery in North Louisiana during 1947, had 108 producing wells by the end of the year

New gas fields.—There were no new gas discoveries in Arkansas in 1947. In North Louisiana there were four. These were the Saline and Zion Hill fields in Bienville Parish, an un-named field in DeSoto Parish discovered by E. C. Laster's Witherspoon No. 1, Sec. 3, T. 14 N., R. 14 W., and the North Delhi field in Richland Parish. North Delhi had 2 producing wells by the end of the year, in the other 3 only the initial well had been drilled. Gas is produced from the James limestone at Saline, from the Hosston at Zion Hill, from the Rodessa in the new field in De Soto Parish, and from the lower Glen Rose in the North Delhi field. The importance of these fields is difficult to determine at this early stage of development.

New distillate fields.—One new distillate field was discovered in Arkansas.

TABLE VIII. NEW DISCOVERIES FOR ARKANSAS AND NORTH LOUISIANA DURING 1947

Operator	Farm	County or Parish	Location Check	Location Sec.Twp.Rng.	Depth Producing Zone	Producing Formation	Initial Production	Date Completed	Reason for Drilling	Remarks	Field Name	No. Prod. Wells on 1-1-48
ARKANSAS												
Houston Oil	Gaughan 1	Calhoun	SW SW NE	34-13S-16W	1990	Meakin	25 bbl oil, 6 bbl SW	12-10-47	Subsurface	Discovery	Locust Bayou	1
McAlester	Warnock 1	Columbia	NW NE	6-17S-19W	7412	Smackover	77 bbl dist, 1½ MM gas	1-9-47	Subsurface	Discovery	Warnock Springs	3
Bradham	Gunnels 2	Columbia	SE NE	16-17S-19W	4226	Hosston	110 bbl oil	4-5-47	Pool Well	New Producing Sand	Village	1
McAlester	Cap Lee A-1	Lafayette	NE SW	24-17S-24W	7044	Smackover	120 bbl oil	6-23-47	Seismic	Discovery	Mars Hill	2
Stewart-Lewis Crow	H. Moore 2	Lafayette	NE NW SE	14-16S-25W	3582	Paluxy	16 bbl oil	5-5-47	Pool Well	New Producing Fm.	Spirit Lake	1
Stewart-Lewis Crow	Moore A-2	Lafayette	SE NW	13-16S-25W	3740	Upper Glen Rose	168 bbl oil	5-2-47	Pool Well	New Producing Formation	Spirit Lake	3
McAlester	Rook A-1	Lafayette	SE NE	17-16S-24W	3819	Paluxy	258 bbl oil	1-27-47	Subsurface	New Producing Formation	West Lewisville	1
Briley et al	Moore 1	Lafayette	NW SW	16-16S-24W	2442	Tokio	23 bbl oil	3-1-47	Subsurface	New Producing Formation	West Lewisville	1
Stewart et al	Johnson 1	Miller	NE NE	29-16S-25W	3990	Upper Glen Rose	105 bbl oil	10-27-47	Subsurface	Discovery	Cypress Lake	1
Carter	Philyaw C-159	Miller	SW SE	36-16S-27W	4940	Kilpatrick (Rodessa)	1720 MCF gas, 72 bbl dist	3-6-47	Subsurface	New Producing Formation	Fouke	Abd. PB to U.G.Rose
Carter	Sturgis 15	Miller	NE SW NW	1-17S-27W	4331	Lower Paluxy	91 bbl oil	6-30-47	Pool Well	New Producing Sand	Fouke	1
Carter	Philyaw C-159	Miller	SW SE	36-16S-27W	4540	Upper Glen Rose	224 bbl oil	12-11-47	Subsurface	New Producing Formation	Fouke	1
Spartan	Stocks 1	Nevada	Cen N/2 NW SE	9-15S-22W	2101	Tokio	20 bbl oil, 50 bbl SW	1-29-47	Subsurface	New Producing Formation	Falcon	1
Sohio	L. Pelt 1	Nevada	NW SW SW	9-15S-22W	3103	Hosston	37 bbl oil	9-23-47	Subsurface	New Producing Formation	Falcon	1
Wampler	Smith 2	Ouachita	SW NW SW	30-15S-17W	2197	Meakin	113 bbl oil	9-11-47	Pool Well	New Producing Formation	Pace City	1
Ormond	Grayson 1	Ouachita	SE SW SE	14-15S-19W	2068	Osan	25 bbl oil	8-27-47	Pool Well	New Producing Formation	Wesson	1
Perry	C. Duke 1	Union	NE NW	13-18S-13W	2889	Hosston	105 bbl oil	5-14-47	Subsurface	Discovery	Sandy Bend	2
Wallingsford	Winn 1	Union	NE NE SE	14-18S-13W	3494	Hosston	150 bbl oil	7-13-47	Subsurface	New Producing Sand	Sandy Bend	1

Wallingsford Winn 1	Union	NE NE SE	14-18S-13W	3494	Hosston	150 bbl oil	7-13-47	Subsurface	New Producing Sand	Sandy Bend	1			

NORTH LOUISIANA

Ark-La. Gas	Smelly 1	Bienville	SW NE		13-16S-5W	6105	James Lime	70 MM CF gas	8-26-47	Pool Well	New Producing Formation	Driscoll	2	
Union-Pure	Frazier 1	Bienville	NE SW		14-14N-6W	6730	James Lime	10 MM CF gas with spray distillate	10-13-47	Subsurface Seismograph	Discovery	Saline	1	
Lion Oil Co.	Oxley 1	Bienville	SW NE		13-17N-6W	7696	Hosston	40 MM CF gas & 8 bbl distillate	5-19-47	Seismograph	Discovery	Zion Hill	1	
Halsey et al	Skidmore 1	Bossier	SE SE		1-16N-11W	2613	Tuscaloosa	17 bbl oil, 30 bbl SW	12-20-47	Subsurface	Discovery	Koran	1	
Wichita Inv.	Jolly 1	Caddo	SE SE SW		27-22N-15W	3297	Kilpatrick (Rodessa)	20 bbl oil, 65 bbl SW	11-8-47	Subsurface	New Producing Formation	Hosston	1	
Phillips	Mitchell 2	Caddo	SW NE SW		8-18N-16W	2350	Goodland Limestone	5 bbl oil, 13 bbl SW	7-28-47	Subsurface	New Producing formation	Longwood	1	
Penrod	Mitchell 1	Catahoula	NW NW		36-8N-7E	9330	Tuscaloosa	5 bbl oil, 20 bbl SW	4-3-47	Seismograph	Discovery	Jonesville	Abd.	
Callery	Strauss 1	De Soto	NE NW		19-14N-14W	4070	Paluxy	124 bbl fluid, 81% oil	1-17-47	Seismograph	Discovery	Kickapoo	1	
Laster	Witherspoon 1	De Soto	SW SE NW		3-14N-14W	5254	Rodessa	2½ MM CF gas	9-7-47	Subsurface	Discovery	Un-Named	1	
Sohio	Ayer Timber 2	Franklin	NW NW SE		26-14N-9E	6608	Fredericksburg	1008 MCF gas, 68 bbl distillate	5-1-47	Pool Well	New Producing Formation	Killens Ferry	1	
Marine Oil	Ayer Timber 1	Madison	NW SW SW		19-15N-10E	5631	Tuscaloosa	1500 MCF gas, 6 bbl distillate	5-22-47	Subsurface	Discovery	Indian Lake	1	
Br. Amer.	Wimberly 1	Red River	NW SW SE		2-13N-10W	2677	Tuscaloosa	8 bbl oil, 150 bbl SW	7-15-47	Seismograph	Discovery	Un-Named	1	
Hunt Oil Co.	Robert Gaines No. 2	Webster	NE SW		19-21N-9W	4785	Hill SD. (Rodessa)	105 bbl oil	12-9-47	Pool Well	New Producing Form.	Cotton Valley	1	
Murphy-Sun	Fed. Land Bank 1	Richland	SE SE NE		10-17N-9E	3153	Lower Glen Rose	9400 MCF gas	4-11-47	Subsurface Seismograph	Discovery	North Delhi	2	
Muslow	Cox 1	Webster	SE SE SW		15-21N-10W	5526	Pettit	22 bbl oil	7-10-47	Pool Well	New Producing Formation	Cotton Valley	1	
Pan Amer.	E. Rugg 1	Union	NE SE		31-20N-1W	8758	Cotton Valley	64 MM CF gas	11-14-47	Seismograph	Discovery	D'Arbonne	1	
Sellers	Monsingo-Rivers 1	Union	NW SW NE		23-22N-1W	2140	Nacatoch	9 bbl oil 2 Hrs.	6-4-47	Subsurface Seismograph Core Drill	Discovery	Ora	108	

TABLE IX

IMPORTANT WILDCATS AND DRY HOLES

COMPLETED IN ARKANSAS & NORTH LOUISIANA DURING 1947

Operator	Farm	County or Parish	Location		Total Depth (Feet)	Deepest Formation Penetrated	Results	Date Completed
			Check	Sec.Twp.Rng.				
			ARKANSAS					
Flesh et al	Rosencrantz 1	Arkansas	NE SE SE	2-3S-6W	3633	Upper Cretaceous	D & A	8-13-47
Ryan Consolidated	R. McCullum 1	Arkansas	NW NW NW	24-2S-5W	3731	Paleozoic	D & A	3-26-47
McAlester	Crossett A-1	Ashley	NE SE	28-15S-6W	3810	Ozan	D & A	5-11-47
McAlester	Crossett B-1	Ashley	NE SW	28-16S-6W	3810	Cotton Valley	D & A	5-26-47
McAlester	Crossett C-1	Ashley	NW NW	27-16S-7W	3809	Cotton Valley	D & A	6-14-47
McAlester	Crossett D-1	Ashley	NE NE	7-16S-7W	3810	Cotton Valley	D & A	7-6-47
McAlester	Crossett E-1	Ashley	SE SE	1-17S-7W	3810	Cotton Valley	D & A	8-15-47
McAlester	Crossett F-1	Ashley	NE NE	28-16S-7W	1798	Wilcox	D & A	8-29-47
Chicago Corp.	Morris 1	Ashley	NE NE	31-18S-4W	4630	Smackover	D & A	9-19-47
Marine	Crawford 1	Bradley	SE SW	17-12S-9W	4504	Eagle Mills	D & A	11-21-47
Johnston et al	Freeman-Smith 2	Calhoun	NE NE SE	31-14S-15W	2725	Probably Tokio	D & A	9-3-47
Jack Carnes	Gaughan 1	Calhoun	NE SE	34-13S-16W	3440	Smackover	D & A	8-11-47
Basin Oil Co.	Dowdle 1	Chicot	Cen NE¼	17-18S-1W	4830	Cotton Valley	D & A	10-7-47
Littlejohn	J. B. Suitor 1	Clark	S½ S½	3-8S-18W	1054	Paleozoic	D & A	5-5-47
Byars Drlg. Co.	Longino-Goode 1	Columbia	SE NE	14-18S-20W	8434	Smackover	D & A	6-30-47
Chicago Corp.	Chaffin 1	Columbia	NW SE	29-18S-20W	9160	Smackover	D & A	12-13-47
McAlester	Paschal 1	Columbia	SW SW	19-15S-20W	6597	Smackover	D & A	10-21-47
Tidewater	J. T. Beene 1	Columbia	SE NW	15-18S-19W	9198*	Eagle Mills Salt	Oil	12-17-47
McAlester	Westbrook A-1	Columbia	SE SE	5-16S-20W	4211	Hosston	D & A	2-10-47
Carter	L. Isom 1	Columbia	SE SW	33-9S-1W	4725	Eagle Mills	D & A	8-25-47
Lohman et al	Stimson 1	Desha	SW NE NW	10-10S-3W	4820	Paleozoic	D & A	10-19-47
Kinard	Reinhart 1	Drew	NW SE SW	15-12S-6W	4523	Eagle Mills	D & A	5-10-47
Cochran	J. A. Cooper 1	Drew	NE NE NW	7-11S-4W	4397	Tokio	D & A	1-22-47

Kinard	Reinhart 1	Drew	NW SE SW	15-12S-6W	4523	Eagle Mills	D & A 5-10-47
Cochran	J. A. Cooper 1	Drew	NE NE NW	7-11S-4W	4397	Tokio	D & A 1-22-47
Phillips	J. M. Walker 1	Hempstead	NW NW	17-10S-24W	1865	Eagle Mills	D & A 4-6-47
Wight et al	Shearer 1	Hempstead	E½ SE NW	13-12S-26W	3216	Eagle Mills	D & A 4-3-47
Kennedy	Phillip Ward 1	Hempstead	SW NW SE	31-9S-23W	1147	Eagle Mills	D & A 9-15-47
Wickliffe	Ward 1	Hempstead	W½ SE	33-9S-23W	1803	Eagle Mills	D & A 10-6-47
Barnsdall-Sohio	Shults 2	Hempstead	SW SW	34-13S-26W	4720	Igneous	D & A 5-20-47
Placid Oil Co.	Munday 1	Hempstead	NW NW	2-14S-26W	5220	Smackover	D & A 12-29-47
Stassi - Stratton	W. Stratton 1	Jefferson	NE SW SW	25-6S-9W	4344	Paleozoic	D & A 10-4-47
Jackson	Ford 1	Jefferson	SE NE SE	6-4S-9W	3153	Igneous	D & A 9-6-47
Wadley et al	A. Enyart 1	Lafayette	SE SE	7-16S-24W	4146	Paluxy	D & A 12-31-47
Wadley	Haberyan 1	Lafayette	SW SE	7-16S-24W	5300	Rodessa	D & A 11-30-47
Chicago Corp.	Baker-Strange Realty Co. 1	Lafayette	SE NW NE	11-16S-24W	4207	Upper Glen Rose	D & A 5-24-47
Burden - Kemp	Brown 1	Lafayette	NE NE	21-16S-24W	4105	Ferry Lake	D & A 3-6-47
McAlester	Hodnutt 1	Lafayette	SW NW	30-15S-23W	4338	Hosston	D & A 10-24-47
Oberthier et al	Brown Est. 1	Lafayette	SE SE SW	26-15S-24W	3899	Rodessa	D & A 7-14-47
McAlester	Shewmake A-1	Lafayette	SE SW NW	7-16S-23W	4982	Hosston	D & A 10-9-47
Big Chief	J. E. Gantt	Lafayette	NW SE SE	10-16S-23W	4005	Upper Glen Rose	D & A 10-29-47
Sparton	McCullain 1	Lafayette	NE SW SE	11-16S-23W	5296	Hosston	D & A 2-16-47
Magnolia	Lester 1	Lafayette	NW NE	22-16S-25W	5467	Hosston	D & A 4-19-47
Barnsdall - Vaughn	Bodcaw 1	Lafayette	SE SW	8-18S-23W	9964	Smackover	D & A 10-17-47
Frankel et al	Weatherspoon 1	Little River	SE NW SE	21-12S-30W	3432	Paleozoic	D & A 8-29-47
Owens	Atkinson 1	Little River	SE SW SE	10-12S-32W	1206	Probably Paluxy	D & A 7-17-47
Carlton et al	Atkinson 1	Little River	NE SW	11-12S-32W	2970	Paleozoic	D & A 4-26-47
Frankel et al	Locke 1	Little River	NE NW NW	19-13S-30W	4704	Paleozoic	D & A 8-2-47
Martin - Reinhart	Naegle 1	Logan	NW NE	11-8N-24W	4780	Paleozoic	D & A 5-10-47
Monhkern	Heffner 1	Lonoke	NE NE NE	35-4N-9W	635	Paleozoic	D & A 5-1-47
Gabriel	Martindale 1	Miller	NW NW	32-14S-28W	5420	Cotton Valley	D & A 3-20-47
Fitzwater et al	Crank 1	Miller	N½ N½ SW	36-15S-26W	2910	Probably Paleozoic	D & A 5-1-47
Conway	Attaway 2	Miller	SE SE NE	3-17S-26W	3720	Paluxy	D & A 2-8-47

Conway	Attaway 1	Miller	NW SE NE	3-17S-26W	5075	Rodessa	D & A	1-4-47
Big Chief	A. Froid 1	Miller	NW SE NW	29-17S-27W	6003	James Limestone	D & A	8-20-47
Weaver et al	Gurdon Lbr. 1	Nevada	NE SW NE	30-12S-20W	2416	Hosston	D & A	5-22-47
Parham et al	Cassady 1	Nevada	SE SE	13-14S-23W	4006	Hosston	D & A	12-15-47
Hunt	Bodcaw Oil Co. 1	Nevada	SW NW	36-14S-23W	6077	Smackover	D & A	7-15-47
Crow et al	Grove Land & Timber Co. 1	Nevada	NE NE NW	5-15S-20W	4021	Hosston	D & A	11-16-47
Carnes et al	Curtis 1	Ouachita	NW SE	10-24-47	2050	Probably Tokio	D & A	10-24-47
Carnes et al	Scott 1	Ouachita	NW NW SE	18-14S-18W	2650	Hosston	D & A	11-8-47
Mid-Continent	Weaver 1	Ouachita	NW SW NE	21-14S-19W	3558	Hosston	D & A	1-24-47
Burden - Kemp	Burton 1	Ouachita	NW SW NE	31-15S-17W	3116	Hosston	D & A	9-7-47
Turner et al	Haltom 1	Ouachita	SW NW NW	18-15S-18W	2380	Brownstown	D & A	5-14-47
Kinard	Anthony 1	Union	SW SE	34-16S-14W	5954	Smackover	D & A	12-12-47
McAlester	Southern Co. 1	Union	NW NW NW	6-16S-17S	4008	Hosston	D & A	12-20-47
Lion	Saw 1	Union	SE SW NW	7-17S-12W	3858	Cotton Valley	D & A	11-11-47
Sutton Oil Co.	Rushing 1	Union	SW SW NW	20-17S-13W	3553	Hosston	D & A	7-25-47
Wentz et al	S. Flournoy et al 1	Union	SW NE NE	18-17S-15W	5002	Cotton Valley	D & A	12-22-47
Wentz	Haney 1	Union	SE NE SW	13-17S-16W	3971	Cotton Valley	D & A	11-30-47
Plymouth	Trammell 1	Union	W½ SE SE	7-18S-12W	6301	Smackover	D & A	3-5-47
Arrow Drlg. Co.	Union Sawmill A-3	Union	NW NW SE	8-18S-12W	3325	Hosston	D & A	6-19-47
Arrow Drlg. Co.	Union Saw Mill A-2	Union	NW NW SE	8-18S-12W	3502	Hosston	D & A	5-31-47
Root	M. S. Webb 1	Union	NW SW NE	13-18S-13W	3610	Hosston	D & A	2-10-47
Mul-Berry Oil Co.	A. Hearin 1	Union	E½ NE SW	19-18S-14W	4069	Hosston	D & A	11-16-47
McAlester	Patterson A-1	Union	SE SW	19-18S-14W	7302	Smackover	D & A	4-4-47
Marine Oil Co.	Huttig 1	Union	W½ SW SW	5-19S-13W	4515	Hosston	D & A	12-20-47
Stanolind - Lion	Magnolia Fee 1	Union	NE NE	3-19S-14W	4501	Hosston	D & A	12-24-47

N. B. Hunt et al	Nebo Oil Co. Fee 1	Bienville	SE NW	33-16N-7W	8260	No Information	D & A	7-1-47
The Texas Co.	Givens 1	Bienville	SW SW	25-16N-9W	6290	Hosston	D & A	9-13-47
Union - Halbouty	Burkett 1	Bossier	NE NW	29-15N-10W	4015	Mooringsport	D & A	11-18-47
J. T. Parks	Lodwick Lbr. 1	Bossier	SE SE SE	17-19N-11W	2012	Tuscaloosa	D & A	4-17-47
Mayfield Drlg. Co.	Cox et al 1	Bossier	NW NW NE	24-19N-11W	5007	Cotton Valley	D & A	8-12-47
J. B. Blanchard	Van Hook	Bossier	SW NW SW	34-20N-11W	3125	Upper Glen Rose	D & A	1-19-47
J. B. Blanchard	Upton 1	Bossier	NE SW NW	34-20N-11W	2925	Upper Glen Rose	D & A	2-22-47
J. B. Blanchard	Wurtzbaugh 1	Bossier	SE SE SW	35-20N-11W	2614	Tuscaloosa	D & A	9-30-47
C. M. Bagley et al	Bundy 1	Bossier	NW NW NE	31-20N-12W	2506	Probably Tokio	D & A	9-5-47
C. W. Beene et al	Muslow 1	Bossier	NE SW	13-21N-14W	1105	Nacatoch	D & A	6-27-47
E. L. Johnston et al	E. N. Moresi 1	Bossier	NE SW NW	15-22N-14W	3254	Paluxy	D & A	11-10-47
Barnsdall-Sohio Stanolind	Johnson 1	Bossier	NE SW SE	30-23N-12W	7510	Hosston	D & A	4-3-47
Barnsdall-Sohio	Bollinger 1	Bossier	NE NE NE	28-23N-13W	3350	Tokio	D & A	2-11-47
F. A. Callery et al	Woolworth 1	Caddo	S½ SE NE	22-15N-15W	5306	Rodessa	D & A	9-23-47
McMurray et al	Johnson 1	Caddo	SW SW	30-18N-16W	1057	Nacatoch	D & A	3-27-47
Lyons - Prentiss	Muslow Oil Co. 1	Caddo	NW NW NW	12-19N-15W	5403	Hosston	D & A	12-14-47
Big Chief	Slattery A-1	Caddo	SW NW SW	15-19N-15W	2493	Paluxy	D & A	8-23-47
Joe Burnham	McCain 1	Caddo	NE SW NW	12-19N-16W	2715	Probably Tokio	D & A	5-17-47
R. A. Young et al	Muslow 1	Caddo	NE SW	5-20N-15W	7340	Cotton Valley	D & A	9-28-47
M. T. Halbouty	N. Smith 1	Caddo	SW SE SE	24-20N-15W	3125	Paluxy	D & A	11-30-47
H. J. Schmitz	Muslow 1	Caddo	SW SW SW	32-21N-15W	3465	Probably Rodessa	D & A	2-24-47
A. Paul Gilbert	Holt 1	Caddo	SE NE SE	11-22N-16W	3321	No Information	D & A	3-7-47
So. Carbon Co.	U. S. A. 1	Caldwell	SW SW NE	26-14N-4E	6006	Paluxy	D & A	11-3-47
Gen. Am. Oil Co.	S. Calvert 1	Catahoula	NE NW NE	35-7N-6E	9606	Washita-Fredericksburg	D & A	10-14-47
H. L. Hunt et al	Nebo F-139	Catahoula	SE NW	19-10N-5E	7788	No Information	D & A	12-5-47
Pan American	McGraw 1	Catahoula	SE SE SE	24-10N-8E	6285	Domal Salt	D & A	8-25-47
Hassie Hunt et al	G. W. James 1	Claiborne	Cen NE¼	10-22N-4W	11007	No Information	D & A	10-24-47
H. L. Hunt et al	Spivey	Claiborne	NW SW	17-23N-6W	5330	Hosston	D & A	1-7-47

F. Boykin King	Maritzky 1	Claiborne	W½ SW NW	27-23N-6W	5211	Sligo	D & A	2-22-47
Hunt - Gulf	Fisher Lbr. Co. 1	Concordia	NE SE	25-7N-8E	10310	Lower Cretaceous	D & A	11-25-47
The Texas Co.	Morgan Walker 1	Concordia	NW NE	20-8N-8E	9500	Washita-Fredericksburg	D & A	11-12-47
Hewit -Dougherty	Cook Land Co. 1	De Soto	SE SW	16-10N-11W	6152	James	D & A	6-10-47
Rex Drlg. Co.	Nabors 1	De Soto	SE SE	10-12N-12W	6410	Probably Hosston	D & A	1-3-47
Phillips Pet. Co.	Gilliland 1	De Soto	SW SW NE	19-12N-14W	6880	Hosston	D & A	12-29-47
A. W. Phillips	G. W. Sample 1	De Soto	NE NE NE	12-13N-14W	3155	Paluxy	D & A	6-10-47
C.H. Murphy	Edwards 1	De Soto	NE SE	16-13N-14W	4331	Mooringsport	D & A	2-24-47
Lacy	Pace 1	De Soto	SE NW	28-13N-16W	6648	Hosston	D & A	3-1-47
T. H. McKinney et al	A. P. Garland 1	De Soto	SE NW SE	7-14N-14W	4205	Paluxy	D & A	4-2-47
Windsor Oil Co.	Burford 1	De Soto	SE SW SE	8-14N-14W	4520	Mooringsport	D & A	4-17-47
Triangle	Long 1	De Soto	SE SW NW	16-14N-14W	4286	Paluxy	D & A	5-5-47
E. C. Laster	C. V. Herbert 1	De Soto	SE NE SW	30-14N-14W	4256	Paluxy	D & A	2-9-47
Ray P. Oden et al	Fee 1	De Soto	Cen E½	35-14N-14W	3165	Paluxy	D & A	7-30-47
Triangle	J. F. Fisher 1	De Soto	SE SW SW	10-14N-15W	4535	Mooringsport	D & A	5-27-47
So. Prod. Co. et al	G. E. Martin 1	De Soto	SE SE SE	23-14N-15W	4134	Paluxy	D & A	7-6-47
Callery et al	C. E. Ellerbe 1	De Soto	E½ SE SW	18-15N-12W	4913	Rodessa	D & A	11-14-47
Stanolind	Chicago Mill & Lumber Co. 2	East Carroll	SW SE	4-18N-11W	3196	Hosston	D & A	4-11-47
Stanolind	Chicago Mill & Lumber Co. 1	East Carroll	NE SEA	5-18N-12E	4330	Hosston	D & A	1-30-47
Stanolind	Chicago Mill & Lumber Co. 3	East Carroll	SE SE NW	9-18N-12E	3952	Hosston	D & A	5-22-47
Union Prod. Co.	O'Brien A-1-a	East Carroll	SW NE SW	5-19N-11E	6292	Smackover	D & A	12-12-47
R. L. Fisher	Tensas Delta Lbr. Co. A-1	Franklin	NE NE NE	5-11N-6E	7138	Tuscaloosa	D & A	11-18-47
H. L. Hunt	C. A. Kincaid 1	Franklin	SE NW	19-12N-7E	7510	Fredericksburg	D & A	10-28-47
Big Chief Drlg. Co.	D. Slack 1	Franklin	SW NW SW	1-15N-7E	3924	Paluxy	D & A	4-25-47
J. A. Goin	A. M. Black 1	Franklin	NW NE	21-15N-7E	4406	Paluxy	D & A	1-2-47
Gulf	Washington A-1	Franklin	N½ SW SW	11-15N-8E	910	Domal Cap Rock	D & A	3-11-47
Gulf	Washington A-2	Franklin	SW SW SW	11-15N-8E	3129	Domal Cap Rock	D & A	4-9-47
Murphy-Sun	J. E. Holt 4	Franklin	NW NE	21-16N-8E	4520	Upper Glen Rose	D & A	8-4-47
			SW NW	25-16N-8E	4500	Paluxy	D & A	1-11-47

Murphy-Sun	J. E. Holt 4	Franklin	NW NE	21-16N-8E	4520	Upper Glen Rose	D & A	8-4-47
Murphy-Sun	Holt 2 (Core Hole)	Franklin	SW NW	25-16N-8E	4500	Paluxy	D & A	1-11-47
Murphy-Sun	West Va. Lbr. Co. 1	Franklin	SE SE	32-16N-8E	4235	Paluxy	D & A	7-9-47
Murphy-Sun	Holt 3 (Core Hole)	Franklin	SW SW SE	34-16N-8E	4312	Paluxy	D & A	3-5-47
Harper et al	Owen-Drexler 1	Franklin	NE NW	6-16N-9E	3667	Paluxy	D & A	8-31-47
W. E. Allaun	Fee 1	Grant	SW SE	14-7N-2W	5440	Probably Midway	D & A	1-9-47
E. F. McGee et al	McGee-Johnson 1	Grant	SE NW SW	24-7N-2W	4045	Wilcox	D & A	12-16-47
H. L. Hunt	Nebo Oil F-138	Grant	NE SW	21-9N-2W	8501	Probably Lower Cretaceous	D & A	11-25-47
Murphy et al	Tensas Delta 1	La Salle	SE NE	36-6N-4E	9022	Washita-Fredericksburg	D & A	10-12-47
H. L. Hunt	Nebo Oil Co. F-137	La Salle	SE NW	20-9N-4E	8495	Prob. Lower Cretaceous	D & A	10-23-47
H. L. Hunt	Nebo Oil Co. A-49	La Salle	S½ NW SE	10-7N-3E	8425	Washita-Fredericksburg	D & A	8-22-47
Placid	La. Central 126	La Salle	NE NE	15-10N-4E	8920	Upper Glen Rose	D & A	10-8-47
Marine	Ayer Timber 3	Madison	SW NE	24-15N-9E	8516	Pine Island	D & A	9-16-47
Marr Prod. Co.	McElwee 1	Madison	NE SE NW	6-15N-10E	6021	Paluxy	D & A	6-2-47
Marine	Ayer Timber Co. 1	Madison	SW SW NE	20-15N-10E	6010	Paluxy	D & A	6-29-47
Murphy-Sun	McKinney 1	Madison	NE NW NW	10-16N-10E	5005	Paluxy	D & A	7-29-47
Murphy-Sun	R. F. Marston 1	Madison	SW SW	19-16N-10E	5234	Paluxy	D & A	9-28-47
Murphy-Sun	J. H. O'Neal 1	Madison	SW NE	8-17N-10E	3409	Lower Glen Rose	D & A	8-31-47
Murphy-Sun	J. K. Mahoney 1	Madison	SE NE NW	11-17N-10E	3497	Upper Glen Rose	D & A	8-15-47
Murphy-Sun	Sondheimer 1	Madison	NE SE	4-17N-11E	3660	Paluxy	D & A	9-18-47
Murphy-Sun	Lewis et al 1	Madison	SW SE	6-17N-11E	3538	Upper Glen Rose	D & A	5-9-47
Murphy-Sun	Bailey-Ward 1	Madison	NW SW SW	13-17N-11W	4211	Paluxy	D & A	10-17-47
Stanolind	Sondheimer 1	Madison	SE SW SE	19-18N-12E	4000	Hosston	D & A	6-20-47
Grage et al	W. R. Gilfoil 1	Madison	SE SW SW	31-18N-13E	4303	Paluxy	D & A	8-4-47
Grage et al	Madison Parish School Board 1	Madison	SE SW SW	35-18N-13E	4515	Paluxy	D & A	4-22-47
Union of Calif.	B. W. Pipes	Morehouse	NW NW NE	19-19N-6E	2977	Hosston	D & A	7-22-47
Union of Calif.	J. W. Thompson 1	Morehouse	NW NE NW	19-19N-6E	2401	Lower Glen Rose	D & A	9-22-47
Angle - Crain	E. M. Clark 1	Morehouse	NW SW SW	2-20N-7E	4036	Cotton Valley	D & A	7-24-47
Taylor-Kirby	E. M. Clark 1	Morehouse	NW NE SW	10-20N-7E	4010	Cotton Valley	D & A	11-23-47
Southern Prod. Co.	4 L Co. 1	Natchitoches	NW NW	11-8N-8W	7816	Rodessa	D & A	12-20-47
Spiller et al	Fee 1	Natchitoches	SE NW	11-9N-10W	3757	Paluxy	D & A	10-14-47

Demetrio et al	Prudential Ins. 5	Natchitoches	NW NE SE	16-10N-9W	1622	Upper Cretaceous	D & A 9-1-47
Warner-Schmitz	W. W. Page 1	Natchitoches	SE NE NW	5-8N-9W	6316	Rodessa	D & A 10-12-47
G. H. Neighbors	H. P. Anderson 1	Natchitoches	NE SW	17-10N-10W	3422	Paluxy	D & A 8-19-47
G. H. Neighbors	Brown Lbr. 1	Natchitoches	SW SE SW	31-11N-10W	3094	Paluxy	D & A 3-15-47
Shriver	Coon et al 1	Ouachita	SW SW	1-16N-1E	6908	Hosston	D & A 3-18-47
R. L. Fisher	Peola Gratz 1	Ouachita	NW SE NW	31-17N-4E	6064	Hosston	D & A 6-16-47
Peterson Drlg. Co.	Breece 1	Ouachita	NE NW SW	14-18N-5E	2790	Upper Glen Rose	D & A 3-8-47
California Co.	Stephens 1	Red River	NE NE	1-11N-9W	3504	Paluxy	D & A 9-8-47
Union Prod. Co.	A. Campbell 1	Red River	SW SW NE	20-12N-10W	7612	Hosston	D & A 8-27-47
Davenport-Garvin	Martin Lbr. Co. 1	Red River	NE SE SE	10-13N-8E	3408	No Information	D & A 7-23-47
Peterson Pet. Co.	Wooten 1	Richland	NE NE SW	25-15N-5E	4005	Paluxy	D & A 10-10-47
McDermott et al	Boughton 1	Richland	NE SW SW	28-15N-6E	4105	Paluxy	D & A 1-29-47
Wakefield	A. K. Baker 1	Richland	NE NW NW	4-15N-7E	3520	Paluxy	D & A 1-9-47
Big Chief	Sayre A-1	Richland	SE NW NE	15-16N-7E	3165	Ferry Lake	D & A 5-12-47
Mitchell-Anderson	Myrick-Tisdale 1	Richland	SE SE	12-17N-5E	3820	Rodessa	D & A 6-28-47
Roy L. Fisher	S. F. Cooper 1	Richland	SW NW SE	21-17N-7E	3308	Lower Glen Rose	D & A 2-2-47
P. E. Parsons et al	Brooks-McKibben 1	Richland	SE NE SE	8-17N-9E	3500	Rodessa	D & A 6-24-47
Dennis et al	J. L. Tatum 1	Richland	NW SW	18-17N-9E	4417	Lower Glen Rose	D & A 7-23-47
Crescent	Dunlap 1	Richland	SE NE	35-17N-9E	4205	Paluxy	D & A 6-15-47
Franklin et al	J. E. Cochran 1	Richland	NW NW	10-17N-8E	3007	Lower Glen Rose	D & A 7-18-47
Franklin et al	Chess-Wymond Lbr. Co. 1	Richland	Cen NE¼	19-18N-6E	2863	No Information	D & A 10-30-47
Franklin	Fee 1	Richland	SW SE	20-18N-8E	3013	No Information	D & A 7-31-47
Fred Kalil et al	E. Greer 1	Richland	SW SW NW	25-17N-7E	3520	Lower Glen Rose	D & A 7-27-47
G. B. Franklin	Fee 2	Richland	SE NW	28-18N-8E	3024	No Information	D & A 8-12-47
G. B. Franklin	Fee 3	Richland	S½ NW SW	27-18N-8E	3379	No Information	D & A 8-27-47
G. B. Franklin	Fee 5	Richland	NE SW NW	20-18N-6E	2771	No Information	D & A 11-19-47
McDaniel Bros.	L.L.L.L. Co. 2	Sabine	N½ NW NE	33-6N-12W	1401	Wilcox	D & A 6-1-47
R. W. Norton Est.	L.L.L.L. Co. 1	Sabine	SW NW	13-6N-13W	5492	Upper Glen Rose	D & A 2-7-47
R. L. Gay et al	Long Bell Lbr. 1	Sabine	NW NW NE	26-7N-14W	2600	Upper Cretaceous	D & A 10-5-47
			NW NE NW	27-7N-14W	2330	Upper Cretaceous	D & A 2-22-47

W. B. Ely et al	Long Bell Lbr. 1	Sabine	NW NW NE	26-7N-14W	2600	Upper Cretaceous	D & A	10-5-47
H. W. McGee	Bauer-Berthold 1	Sabine	NW NE NW	27-7N-14W	2330	Upper Cretaceous	D & A	2-22-47
H. H. Duck et al	Peavy-Wilson 1	Sabine	S½ SE SW	31-8N-13W	5915	Lower Glen Rose	D & A	8-214-7
R. W. Norton, Jr.	D. C. Etheridge 1	Sabine	NW SE	12-9N-12W	6006	Rodessa	D & A	3-29-47
Southern Prod. Co.	Tensas L. Co. 1	Tensas	NW NW	6-10N-10E	4379	Wilcox	D & A	12-10-47
W. W. Smith	J. B. Miller 1	Tensas	NE NW SW	18-10N-10E	5015	Wilcox	D & A	12-2-47
C. H. Osmond	Hogue Bros. 1	Tensas	SE SE SE	21-13N-13E	7524	Upper Cretaceous Chalk	D & A	10-4-47
Markham, Rivers & Burt	A.L. & O.B. Slade 1	Union	SW SW NE	6-22N-1E	2530	Ozan	D & A	10-7-47
Peterson Drlg. Co.	W. O. Galloway 1	Union	SW SE SW	18-22N-1E	2332	Marlbrook	D & A	8-27-47
Sellers et al	Monzingo-Rivers Lbr. Co. 5	Union	NW SE SW	19-22N-1E	2490	Ozan	D & A	7-22-47
Morris	L. Patterson 1	Union	NW SW SW	28-22N-1E	2261	Nacatoch	D & A	9-14-47
P. E. Parsons et al	Gordon Taylor 1	Union	SW NW SE	34-22N-1E	3169	Lower Glen Rose	D & A	7-14-47
C. H. Murphy, Jr.	Bergeron 1	Union	S½ NW SE	16-21N-1E	3900	Hosston	D & A	6-6-47
Shell	Frost 1	Union	SE SW NE	6-21N-1E	3600	Lower Cretaceous	D & A	3-18-47
Shell	Frost 2	Union	SW SE	14-22N-1W	3500	Lower Glen Rose	D & A	4-11-47
Shell	Frost 3	Union	SW SW SE	31-23N-3E	3550	Probably Hosston	D & A	4-27-47
Shell	Frost 4	Union	E½ NW	11-21N-2E	3280	Probably Lower Glen Rose	D & A	5-6-47
Shell	Frost 5	Union	SW NE	31-23N-2E	3131	Probably Lower Glen Rose	D & A	5-13-47
Shell	Frost 6	Union	E½ NW NW	13-23N-1E	3054	Probably Lower Glen Rose	D & A	5-13-47
Funston et al	Alton Odom 1	Union	NW NE NW	2-21N-1W	2178	Nacatoch	D & A	8-19-47
L.& M. Drlg. Co.	Crompton, Jr. 1	Union	SW SW NE	2-21N-1W	2501	Probably Ozan	D & A	8-18-47
F. B. King et al	E. L. Ramsey 1	Union	NW SE SE	3-21N-1W	3252	Lower Glen Rose	D & A	7-18-47
Primos & Sharp	W. Green 1	Union	NE SW SE	7-21N-1W	2313	Lower Glen Rose	D & A	9-7-47
A. K. Kilpatrick	A. S. Futch 1	Union	NE SE SE	18-21N-1W	3210	Upper Glen Rose	D & A	10-15-47
Sharp & Kemp	Rabun Est. 1	Union	SE NW NW	28-21N-1W	2543	Ozan	D & A	7-12-47
California Co.	W. E. Weldon 1	Union	SE SW NE	24-21N-3W	8476	Cotton Valley	D & A	3-8-47
Sharp & Kemp	Ivy Thomas 1	Union	SW NE SE	4-22N-1W	2307	Nacatoch	D & A	11-1-47
W. A. Futch et al	Fee 1	Union	SE SE SW	9-22N-1W	2257	Nacatoch	D & A	6-29-47
Roberts et al	Luzader 1	Union	SE SE SE	10-22N-1W	2228	Nacatoch	D & A	7-7-47
Fletcher & Sneed	R. F. Ward 1	Union	NE SE NW	30-22N-1W	2533	Ozan	D & A	7-24-47

J. C. Le Sage	P. P. Price Est. 1	Union	NE SW NW	32-22N-1W	2197	Nacatoch	D & A	7-8-47
Rogers Lacy et al	Baughman 1	Union	NE SW NE	36-22N-1W	2561	Tokio	D & A	7-20-47
Rogers Lacy et al	Baughman 1	Union	NE SW NE	36-22N-1W	2561	Tokio	D & A	7-20-47
Crow Prod. Co.	Gatson 1	Union	NE NW SW	10-23N-1W	2202	Nacatoch	D & A	11-1-47
Howard M. Jones et al	Ritchie Groc. Co. 1	Union	SW SW SE	10-23N-1W	2255	Nacatoch	D & A	12-21-47
Taylor-Kirby Drlg.	Boone 1	Union	NE SE NE	27-23N-1W	2532	Ozan	D & A	12-12-47
Kilpatrick et al	C. Hollis 1	Union	Cen E½ NE	32-23N-1W	3153	Lower Glen Rose	D & A	12-10-47
T. L. James & Co.	E. C. Carroll 1	Union	SE SE SW	34-23N-2W	2700	Probably Tokio	D & A	12-31-47
T. L. James & Co.	G. H. Miller 1	Union	NE SW SE	36-23N-2W	6923	Cotton Valley	D & A	6-26-47
Cotton Valley Oper.	Oliphant-Banks 2	Webster	SE NW	34-21N-10W	14967**	Eagle Mills Salt	Distil-late	4-21-47
Hunt	Haynesville Mercantile Co. 1	Webster	NE NW	9-23N-9W	12359	No Information	D & A	11-15-47
B. E. Reid	R. E. McCartney 1	Winn	W½ SE SW	23-10N-1W	1536	Probably Wilcox	D & A	1-7-47
B. E. Reid et al	R. E. McCartney 2	Winn	NW SE SW	23-10N-1W	1390	Probably Midway	D & A	9-5-47
B. E. Reid et al	O. McCartney 1	Winn	SW NE NW	26-10N-1W	1537	Probably Wilcox	D & A	4-1-47
H. L. Hunt	Goodpine F-136	Winn	NW SW	21-10N-2W	6432	Domal Salt	D & A	2-4-47
H. L. Hunt et al	Goodpine F-135	Winn	NE SE	35-11N-5W	9428	Hosston	D & A	1-3-47
Stanolind	Tremont 1	Winn	NW SW	30-12N-1W	12569	Hosston	D & A	8-30-47
H. M. Naylor	B. B. Terral 1	Winn	SE SE NW	2-13N-3W	6010	Paluxy	D & A	4-4-47

* Plugged back and perforated 8202-05' in Smackover

** Plugged back and perforated 8458-92' in Cotton Valley

This was the Warnock Springs field. Production is from the Smackover limestone. Three wells were completed during 1947. Two distillate fields were discovered in Louisiana. These were the Indian Lake field in Madison Parish and the D'Arbonne field in Union Parish. Only the discovery wells had been drilled in these fields by the end of the year. The Indian Lake field produces from a sandstone in the Marine Tuscaloosa and the D'Arbonne field from a Cotton Valley sandstone 1,000 feet below the top of the formation and 400 feet below the Bodcaw sandstone.

New oil-producing zones in old fields.—Eleven new oil-producing zones were added to Arkansas fields during 1947 and 4 to fields in North Louisiana.

In the Spirit Lake field, Lafayette County, Arkansas, the Paluxy and Upper Glen Rose were added as new producing zones. In the West Lewisville field, Lafayette County, the Tokio and Paluxy were new producing zones. This field, a 1946 discovery, has been a disappointment. Only 3 oil wells have been completed. Four dry holes have been drilled in the immediate are of the field. Production was marginal in the 3 completed wells. Two deeper oil-producing zones were discovered in the Fouke field. The only producing zone prior to 1947 was the upper Paluxy. Oil production in the field was developed in 1947 from a sandstone in the lower part of the Paluxy and from the upper Glen Rose. In the Falcon field in Nevada County the Tokio and Hosston were added as producing zones. Nacatoch production was discovered in this field in 1938 but few wells were drilled and it had been abandoned for several years prior to 1947. In Ouachita County the Meakin sandstone was added in the Pace City field. In the Wesson field in Ouachita County an Ozan (?) sandstone 230 feet below the base of the Annona chalk was a new productive zone for the field. A shallower Hosston sandstone produced oil in the Sandy Bend field in Union County.

Four new oil-producing zones were added to existing fields in North Louisiana in 1947. In the Longwood field a marginal oil producer was secured from the Goodland limestone at the top of the Lower Cretaceous. It is not probable that this will be an important producing formation. In the Hosston field the Kilpatrick limestone (Rodessa) produced in one well. In the Cotton Valley field in Webster Parish the Pettit porous zone of the Sligo formation and the Hill zone of the Rodessa were new oil-producing levels for the field. Both are irregularly developed through the field and will probably not add materially to the reserves.

New gas-producing zones in old fields.—There were no new gas zones discovered in old fields in Arkansas during 1947. In North Louisiana there was only one. The first James limestone production in the Driscoll field was brought in by reworking an old Hosston gas well. Two gas wells were completed in this formation during the year. This is the first James production in North Louisiana excepting possibly from some correlative beds in the Rodessa field.

New distillate-producing zones in old fields.—Two new distillate zones were discovered in Arkansas and one in North Louisiana in 1947. In the Village field in Columbia County, Arkansas, a shallower distillate sand was opened in the

Hosston. Distillate production from the Rodessa in one well was discovered in the Fouke field in Miller County, Arkansas. This was later plugged off and the well recompleted as an oil well in an upper Glen Rose sand.

In North Louisiana Fredericksburg distillate was produced in the Killens Ferry field in Franklin Parish. This is the first Fredericksburg production in eastern Louisiana. This is from a sandstone and it apparently is very local in its distribution.

IMPORTANT NEW FIELDS

Warnock Springs field (Columbia County, Arkansas).—This field is 7 miles northeast of Magnolia, county seat of Columbia County and 2 miles north of the Magnolia field. The location for the discovery well was based on subsurface evidence. Several Smackover dry holes had been drilled just outside of what later was proved to be the productive closure. H. A. Wright's Woodward No. 1, Sec. 6, T. 17 S., R. 19 W., had a good showing of oil in the Smackover limestone but was abandoned on May 3, 1945, after testing some oil and salt water on a drill-stem test. A location was then staked by the McAlester Fuel Company, 1,900 feet northwest of this well for the R. S. Warnock No. A-1, Sec. 6, T. 17 S., R. 19 W. This well began drilling on November 6, 1946, and was drilled to 7,418 feet and completed on January 9, 1947, as the discovery well of the Warnock Springs field. A flow of 77 barrels of 61° gravity distillate and an estimated 1,500MCF of gas were obtained from casing perforations between 7,412 and 7,415 feet. Production lis from the Smackover limestone. Three distillate wells were completed during 1947. Data from these wells suggest an elongate anticlinal closure similar to most of the other producing Smackover fields of South Arkansas. Wells are drilled on 160-acre units.

Ora field (Union Parish, Louisiana).—This field is located 6 miles northwest of Farmerville, county seat of Union Parish. The Shell Oil Company conducted an extensive seismic program and drilled a number of deep core holes in the general area prior to the discovery of the field. A rumor of oil saturation in the Shell's Frost Lumber Company No. 2, Sec. 14, T. 22 N., R. 1 W., a core test, resulted in the drilling of the discovery well in the field. This well was R. T. Sellers *et al.* Monzingo-Rivers Lumber Company No. 1, Sec. 23, T. 22 N., R. 1 W. This well was completed on June 4, 1947. Perforations in the Nacatoch sandstone from 2,140 to 2,145 feet yielded an initial flow of 8½ barrels of 29.4° gravity oil in 2 hours through ⅛-inch tubing choke. The gas-oil ratio was 246:1. Tubing pressure was 55 pounds and casing pressure 80 pounds.

Structurally the field is an elongate anticlinal fold of low relief. The closure, while not completely defined on the west, is less than 35 feet on the top of the Nacatoch. The field trends northeast-southwest and is 4½ miles long and from ¼–1 mile wide. Spacing is one well to 10 acres. The pay sand occurs 50–60 feet below the top of the Nacatoch formation. The sand is highly permeable but in

some locations is locally absent or grades into non-permeable sandy chalk. About half of the wells flow and half are initial pumpers. At the end of the year 108 producing wells had been drilled and total production in the field was 667,000 barrels of oil. The Ora field was producing 9,500 barrels daily on January 1, 1948, and was the best discovery in the area during 1947.

IMPORTANT DEVELOPMENTS IN OLD FIELDS

Wesson field (Ouachita County, Arkansas).—The most important development in existing fields was the extension of Hogg sandstone production in this field 3 miles southwest. This extension averages somewhat more than ¼ mile wide. The net sand varies from a few feet to 40 feet in thickness. The sand pinches out updip and is a stratigraphic accumulation on the flank of the structure. During the year, 66 oil wells were completed in the Wesson field; the most of these were Hogg sand producers. The Hogg reservoir is probably the updip equivalent of the Pettit limestone of North Louisiana. It occurs at an average depth of 3,100 feet. The sand is undersaturated with gas, and there is apparently no natural water drive. All wells are completed as pumpers. Initial daily production varies from 65 to 385 barrels with an average of about 150 barrels. Remarkable permeabilities (more than 8,000 millidarcys) have been encountered in this sand. The operators of Hogg sand wells plan a water-flooding operation in the near future to permit maximum oil recovery.

IMPORTANT DEEP TESTS IN FIELDS

Atlanta field (Columbia County, Arkansas).—The Tide Water's J. T. Beene No. 1, Sec. 15, T. 18 S., R. 19 W., was deepened from the upper Smackover into the Eagle Mills salt. This was the first sub-Smackover test in the field. The upper Smackover is the producing zone in the field. The lower Smackover was dense limestone. The base of the Smackover (the top of the Eagle Mills) was encountered at 9,137 feet and the salt at 9,173 feet. The well was drilled 25 feet into the salt to 9,198 feet. It was then plugged back and recompleted as an upper Smackover oil well.

Logansport field (De Soto Parish, Louisiana).—Prior to 1947 the deepest well in this field penetrated 600 feet into the Hosston formation. The Skelly's Thelma Nash No. 1, Sec. 20, T. 12 N., R. 16 W., on the north flank of the field, was drilled during 1947 to 11,664 feet. Evaporites of the Eagle Mills were encountered at 11,653 feet. The Eagle Mills salt was not reached. The well was plugged back to the Pettit limestone (6,106 feet) and completed, flowing 123 barrels of 45° gravity distillate in 14 hours through a ⅜-inch tubing choke with a gas-oil ratio of 17,180:1. This well extended the field 2 miles.

Epps field (East Carroll Parish, Louisiana).—This field produces gas from the Upper Cretaceous "Monroe gas rock" at 2,400 feet. No deep tests had been drilled prior to 1947. The Union Producing Company's O'Brien No. A-1-a, Sec. 5, T. 19 N., R. 11 E., was drilled to 6,292 feet and completed as a dry hole on

December 12, 1947. This well was located near the crest of the Epps structure. The Cotton Valley directly underlies the Upper Cretaceous "Gas rock" in this area. The Smackover was encountered at 5,196 feet. The base of the Smackover was not reached. The Cotton Valley and Smackover contained much igneous material, both pyroclastic and crystalline. No showings were encountered below the "Gas rock." The Epps field is located on a local structure in the area of the Monroe uplift. Igneous material is commonly found in wells on this regional feature.

Chatham field (Jackson Parish, Louisiana).—The Shell's Tremont Lumber Company No. 3, Sec. 21, T. 15 N., R. 1 W., was the first Cotton Valley test and the third well drilled in this field. Production is gas from the Hosston formation between 9,600 and 9,850 feet. The Tremont No. 3 penetrated 1,600 feet of the Cotton Valley with no commercial showings and was plugged back and completed as a Hosston gas well from casing perforations between 9,820 and 9,844 feet.

Nebo field (La Salle Parish, Louisiana).—H. L. Hunt's Nebo Oil Company No. A-49, Sec. 10, T. 7 N., R. 3 E., was drilled to 8,425 feet. No showings were encountered below the Wilcox producing zone of the field, and the well was plugged and abandoned on August 8, 1947. This was the first deep test in the field. The Lower Cretaceous (Washita-Fredericksburg) was encountered at 8,025 feet.

Indian Lake field (Madison Parish, Louisiana).—The Marine Oil Company's Ayer Timber Company No. 3, Sec. 24, T. 15 N., R. 9 E., was drilled to 8,516 feet. This was the first well in the field to penetrate beds below the Paluxy. This well drilled into the Pine Island formation which was encountered at 8,340 feet. No showings were found below the lower Tuscaloosa which is productive in the field and the well was plugged and abandoned on September 16, 1947.

Cotton Valley field (Webster Parish, Louisiana).—The deepest well in Arkansas and North Louisiana was drilled in 1947 in the Cotton Valley field. This was the Cotton Valley Operators Committee's O. S. Banks No. 2, Sec. 34, T. 12 N., R. 10 W., which was drilled to 14,967 feet. The Smackover was encountered at 10,318 feet and the top of the Eagle Mills salt at 10,666 feet. The well was in salt at the total depth after penetrating 3,301 feet. The deepest previous test in the field was the Cotton Valley Operator's Gray No. 1, Sec. 26, T. 21 N., R. 10 W., drilled to 10,681 feet in 1944. The upper 600 feet of the Smackover was penetrated in this well. This well is 1½ miles northeast of the Banks No. 2. The excessive thickness of the salt encountered in the Banks well is thought by some to be due to a salt swell on the Cotton Valley structure. The Cotton Valley Operators Committee plans to drill a deeper well in the field in an attempt to test beds below the salt. The Banks well was not drilled deeper because of a difficult fishing job. The well was plugged back and completed as a Cotton Valley distillate well from casing perforations between 8,458 and 8,492 feet.

BENTON
CARROLL
BOONE
BAXTER
MARION
FULTON
RANDOLPH
CLAY
WASHINGTON
MADISON
NEWTON
SEARCY
STONE
IZARD
SHARP
LAWRENCE
GREENE
INDEPENDENCE
CRAIGHEAD
MISSISSIPPI
CRAWFORD
FRANKLIN
JOHNSON
POPE
VAN BUREN
CLEBURNE
JACKSON
POINSETT
CRITTENDEN
LOGAN
CONWAY
WHITE
WOODRUFF
CROSS
SEBASTION
YELL
PERRY
FAULKNER
ST. FRANCIS
SCOTT
PULASKI
LONOKE
PRAIRIE
LEE
LITTLE ROCK
SALINE
MONROE
PHILLIPS
POLK
MONTGOMERY
GARLAND
HOT SPRING
GRANT
JEFFERSON
ARKANSAS
HOWARD
PIKE
CLARK
SEVIER
DALLAS
CLEVELAND
LINCOLN
DESHA
LITTLE RIVER
HEMPSTEAD
NEVADA
OUACHITA
CALHOUN
DREW
TEXARKANA
MILLER
LAFAYETTE
MAGNOLIA
COLUMBIA
EL DORADO
UNION
BRADLEY
ASHLEY
CHICOT
ARKANSAS
LOUISIANA
MOREHOUSE
BASTROP
CLAIBORNE
HOMER
UNION
WEST CARROLL
EAST CARROLL
CADDO
BOSSIER
WEBSTER
LINCOLN
MONROE
RICHLAND
DELHI
SHREVEPORT
RUSTON
OUACHITA
MADISON
BIENVILLE
JACKSON
RED
RIVER
COUSHATTA
DE SOTO
CALDWELL
FRANKLIN
TENSAS
WINN
NATCHITOCHES
LA SALLE
JENA
SABINE
MANY
GRANT
CATAHOULA
CONCORDIA
NEW OIL FIELD
NEW DISTILLATE FIELD
NEW GAS FIELD
NEW OIL ZONE - OLD FIELD
NEW DISTILLATE ZONE - OLD FIELD
NEW GAS ZONE - OLD FIELD
KEY TO NEW DISCOVERIES:
1 FOUKE
2 CYPRESS LAKE
3 SPIRIT LAKE
4 WEST LEWISVILLE
5 MARS HILL
6 FALCON
7 JONESVILLE
8 WESSON
9 WARNOCK SPRINGS
10 VILLAGE
11 PAGE CITY
12 LOCUST BAYOU
13 SANDY BEND
14 HOSSTON
15 LONGWOOD
16 KORAN
17 COTTON VALLEY
18 ZION HILL
19 DRISCOLL
20 D'ARBONNE
21 ORA
22 NORTH DELHI
23 INDIAN LAKE
24 KILLENS FERRY
25 SALINE
26 UN-NAMED
27 UN-NAMED
28 KICKAPOO
SCALE IN MILES:
0 6 12 18 24 30 36

FIG. 1

IMPORTANT EXTENSIONS TO FIELDS

Only the more important extensions will be mentioned. In Ouachita County, Arkansas, Lee and Burnett's E. H. Morgan No. A-1, Sec. 27, T. 15 S., R. 19 W., extended the Wesson field 1 mile southwest.

In Caddo Parish, Louisiana, Stanolind's Fred Wappler No. 1, Sec. 20, T. 17 N., R. 16 W., was dually completed from the Pettit and Hosston and extended distillate production from these zones in the Waskom field 1¾ miles east. In Natchitoches Parish, Louisiana, J. F. Lent's E. L. Whatley No. 1, Sec. 20, T. 10 N., R. 10 W., extended the Ajax field 1¾ miles southeast. In the Ora field in Union Parish, Louisiana, R. T. Sellers' P. J. Tucker No. 2, Sec. 3, T. 21 N., R. 1 W., extended oil production 2¼ miles southwest.

TABLE X

GEOPHYSICAL ACTIVITY, 1947

(Crew Weeks by Months)

Month	*Seismograph*	*Gravity Meter*	*Magnetometer*	*Core Drill*	*Total*
			ARKANSAS		
January	39	13	4	4	60
February	30	16	0	1	47
March	29	16	0	2	47
April	26	16	0	4	46
May	27	15	0	5	47
June	18	11	3	4	36
July	30	21	5	6	62
August	28	16	5	10	59
September	34	16	8	14	72
October	39	19	10	16	84
November	31	16	9	15	71
December	37	13	12	12	74
Total	368	188	56	93	705
			NORTH LOUISIANA		
January	48	54	0	4	106
February	48	54	0	4	106
March	44	48	4	4	100
April	50	50	0	4	104
May	61	54	0	5	120
June	49	40	0	8	97
July	63	40	0	8	111
August	55	40	0	1	96
September	68	33	0	0	101
October	90	37	0	3	130
November	72	28	2	4	106
December	70	32	1	1	104
Total	718	510	7	46	1,281

GEOPHYSICAL DATA

Geophysical and core drilling data for 1947 are summarized in Tables X, XI, and XII. Crew weeks in Arkansas increased from 470 in 1946 to 705 in 1947. Especially notable is the marked increase in gravity exploration. Only 37 crew weeks were recorded in 1946; this number increased to 188 weeks in 1947.

Geophysical activity in North Louisiana decreased from 1,779 crew weeks to 1,281 in 1947. Core drilling increased from 7 weeks in 1946 to 46 weeks in 1947.

TABLE XI

GEOPHYSICAL ACTIVITY IN ARKANSAS, 1947

(Crew Weeks by Counties)

County	*Seismo-graph*	*Gravity Meter*	*Magnetom-eter*	*Core Drill*	*Total*
Arkansas	7	0	0	0	7
Ashley	10	22	2	0	34
Bradley	14	0	3	0	17
Calhoun	22	1	1	0	24
Chicot	3	14	14	0	31
Clark	0	0	4	0	4
Cleveland	1	2	4	0	7
Columbia	63	39	4	0	106
Dallas	0	0	2	0	2
Desha	9	5	2	0	16
Drew	21	14	2	0	37
Grant	0	0	3	0	3
Hempstead	4	0	0	1	5
Hot Springs	0	8	3	0	11
Jefferson	0	4	0	0	4
Lafayette	88	45	0	31	164
Lincoln	2	5	2	0	9
Miller	30	8	0	5	43
Nevada	14	0	5	2	21
Ouachita	2	0	3	3	8
Saline	0	1	0	0	1
Union	78	20	2	51	151
Total	368	188	56	93	705

EXPLORATORY METHODS RESULTING IN NEW DISCOVERIES

Subsurface exploration was responsible for 16 of the new discoveries for 1947 and the seismograph for 6.

PUBLICATIONS

In 1947 the Shreveport Geological Society published Volume II of the "Reference Report on Certain Oil and Gas Fields of North Louisiana, South Arkansas, Mississippi and Alabama." This volume contains articles on 25 oil and gas fields and includes structure maps and type electrical logs for each field. There are electrical log cross sections for many of the fields; in addition, there are 11 regional electrical log sections.

TABLE XII

GEOPHYSICAL ACTIVITY IN NORTH LOUISIANA, 1947

(Crew Weeks by Parishes)

Parish	*Seismo-graph*	*Gravity Meter*	*Magnetom-eter*	*Core Drill*	*Total*
Bienville	35	30	0	5	70
Bossier	14	13	0	0	27
Caddo	25	12	0	0	37
Caldwell	41	31	0	0	72
Catahoula	67	60	0	0	127
Claiborne	77	20	0	8	105
Concordia	41	82	0	0	123
De Soto	56	10	0	6	72
East Carroll	0	2	0	0	2
Franklin	22	46	2	0	70
Grant	8	27	0	2	37
Jackson	57	1	0	2	58
La Salle	12	6	0	0	18
Lincoln	29	3	0	0	32
Madison	14	20	0	0	34
Morehouse	15	9	0	0	24
Natchitoches	21	23	0	2	46
Ouachita	12	8	0	0	20
Red River	2	19	0	4	25
Richland	1	13	5	0	19
Sabine	9	8	0	0	17
Tensas	4	16	0	0	20
Union	64	21	0	0	85
Webster	58	19	0	19	96
West Carroll	0	1	0	0	1
Winn	34	10	0	0	44
Total	718	510	7	46	1,281

TABLE XIII

NEW DISCOVERY METHODS

	Subsurface	*Pool Well*	*Seismograph*	*Subsurface and Seismograph*	*Subsurface-Seismograph-Core Drill*
Number of New Discoveries	16	10	6	2	1

Two articles by R. T. Hazzard, B. W. Blanpied, and W. C. Spooner are presented. The first is titled "Notes on Correlations of the Cretaceous of East Texas, South Arkansas, North Louisiana, Mississippi and Alabama" and the second is "Notes on the Stratigraphy of the Formations Which Underlie the Smackover Limestone in South Arkansas, Northeast Texas and North Louisiana."

This volume is an invaluable reference work to those interested in the geology of the area covered.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 1065-1078, 1 FIG., 8 TABLES

DEVELOPMENTS IN SOUTHEASTERN STATES IN 1946 AND 1947[1]

R. M. HARRIS[2] AND W. M. PAYNE[2]
Jackson, Mississippi

ABSTRACT

The Southeastern district, as in previous years, includes Alabama, Florida, Georgia, and Mississippi.

Inasmuch as no development paper was written for 1946, the information presented here covers the years 1946 and 1947.

Wildcating continued at approximately the same rate as in previous years while development in established producing areas showed a substantial increase.

Geophysical crew weeks worked declined due principally to the decrease in gravity-meter work.

Alabama had a total of 12 wildcats drilled and abandoned during 1946 and a total of 20 wildcats drilled and abandoned during 1947.

In the Gilbertown field, Choctaw County, Alabama, 3 producers and 2 dry holes were completed in 1946 and 6 producers and 1 dry hole completed in 1947. Production from this field was 382,903 barrels in 1946 and 463,776 barrels in 1947. A total of 1,089,560 barrels had been produced from this field by the end of 1947.

A total of 839 crew weeks of geophysical work was completed in Alabama during 1946 and 476 crew weeks in 1947.

Florida had a total of 21 wildcats drilled and abandoned during 1946 and a total of 25 in 1947.

In the Sunniland field, Collier County, 2 producers were added during 1946, while 2 producers and 1 dry hole were added during 1947. Production figures for the field show 56,863 barrels of oil produced from 4 wells during 1946 and 259,136 barrels produced from 5 wells during 1947, bringing the total cumulative production to 359,694 barrels at the end of 1947.

Geophysical crew weeks worked in Florida totaled 535 in 1946 and 249 in 1947.

Three wildcat wells were drilled and abandoned in Georgia during 1946 and 5 in 1947.

Geophysical work in 1946 totaled 82 crew weeks and in 1947, 27 crew weeks.

Mississippi had a total of 81 wildcats drilled during 1946 which resulted in the discovery of 3 new fields and 4 salt domes. Ninety-three wildcats were drilled in 1947; 3 fields and 5 salt domes were discovered. In the established producing areas of the state, 158 producers and 19 dry holes were added in 1946 and 340 producers and 40 dry holes in 1947.

All Mississippi fields produced a total of 24,296,116 barrels of oil and condensate during 1946 and a total of 35,183,838 barrels during 1947, bringing the total cumulative production for the state to 162,409,951 barrels at the end of 1947.

There was a decrease in geophysical crew weeks from 2,870 in 1946 to 1,839 in 1947.

INTRODUCTION

The southeastern district includes the states of Alabama, Florida, Georgia, and Mississippi.

Data for each of the four states are presented separately and cover developments during the year 1946 as well as 1947 in as much as no development paper was written for the *Bulletin* for 1946.

No distrinction is made herein between wildcat wells and "stratigraphic tests" where these latter penetrated one or more of the present producing formations of the area and were drilled in such a manner as to make it possible to complete as oil or gas wells if the occasion arose.

[1] Manuscript received, March 12, 1948. Presented by title before the Association at Denver, April 27–29, 1948.

[2] Consulting geologists. The writers wish to express their thanks to the Mississippi Oil Scouts Association for furnishing numerous data used in this paper.

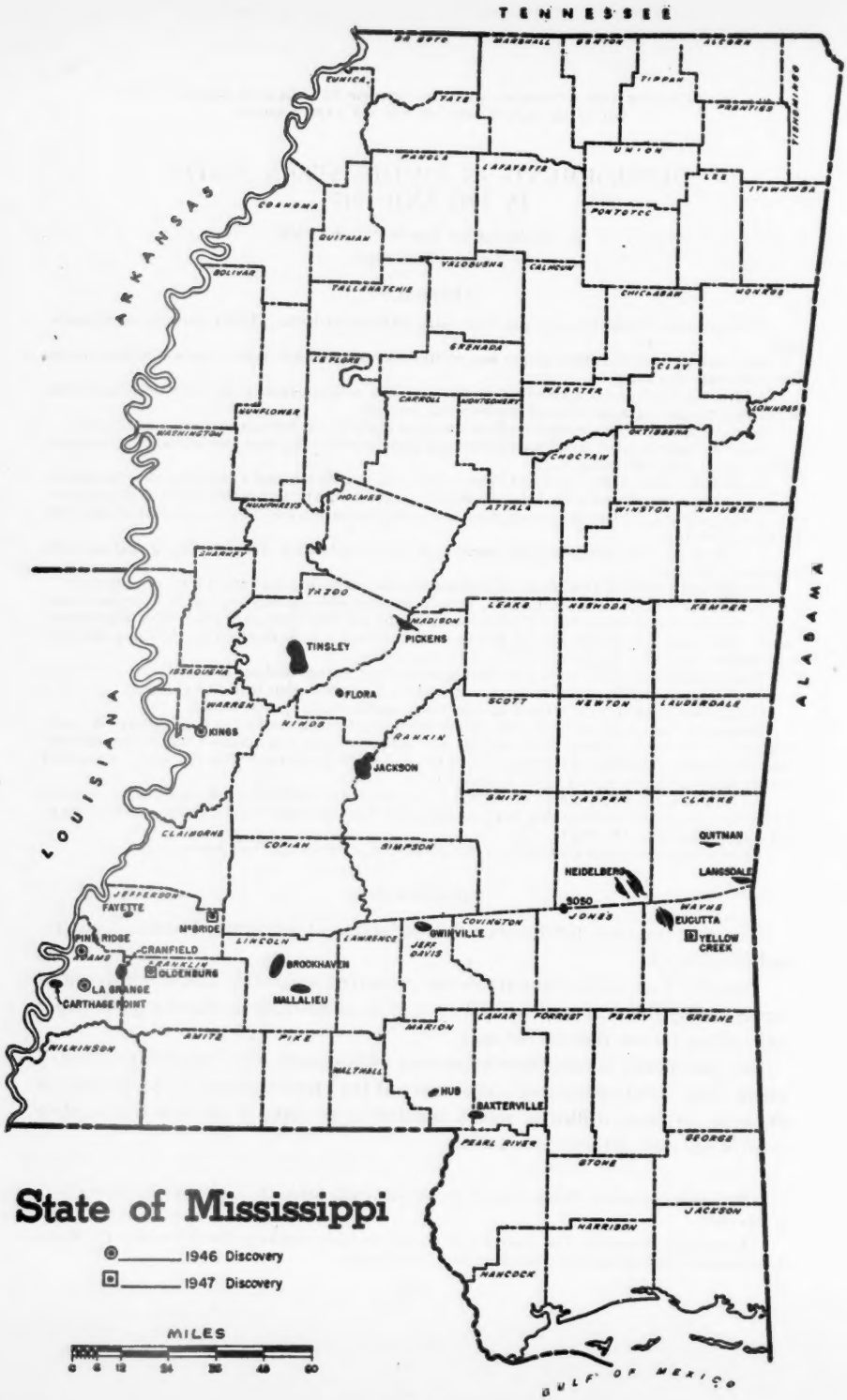
TENNESSEE
ARKANSAS
LOUISIANA
ALABAMA
DE SOTO
MARSHALL
BENTON
ALCORN
TUNICA
TATE
TIPPAH
PRENTISS
TISHOMINGO
PANOLA
LAFAYETTE
UNION
LEE
ITAWAMBA
COAHOMA
PONTOTOC
QUITMAN
BOLIVAR
YALOBUSHA
CALHOUN
CHICKASAW
MONROE
TALLAHATCHIE
GRENADA
CLAY
LE FLORE
WEBSTER
CARROLL
MONTGOMERY
LOWNDES
SUNFLOWER
WASHINGTON
OKTIBBEHA
CHOCTAW
HUMPHREYS
HOLMES
ATTALA
WINSTON
NOXUBEE
SHARKEY
YAZOO
MADISON
LEAKE
NESHOBA
KEMPER
PICKENS
TINSLEY
ISSAQUENA
FLORA
WARREN
SCOTT
NEWTON
LAUDERDALE
KINGS
NIHOB
RANKIN
JACKSON
SMITH
JASPER
CLARKE
CLAIBORNE
COPIAH
SIMPSON
QUITMAN
HEIDELBERG
LAMBSDALE
JEFFERSON
FAYETTE
SOSO
WAYNE
JONES
McBRIDE
COVINGTON
EUCUTTA
PINE RIDGE
LINCOLN
LAWRENCE
JEFF DAVIS
SWINVILLE
YELLOW CREEK
CRANFIELD
FRANKLIN
OLDENBURG
BROOKHAVEN
LA GRANGE
CARTHAGE POINT
MALLALIEU
MARION
LAMAR
FORREST
PERRY
GREENE
WILKINSON
AMITE
PIKE
WALTHALL
HUB
BAXTERVILLE
PEARL RIVER
GEORGE
STONE
JACKSON
HARRISON
HANCOCK
GULF OF MEXICO
State of Mississippi
1946 Discovery
1947 Discovery
MILES
0 6 12 24 36 48 60

FIG. 1

ALABAMA

Twelve wildcats were drilled and abandoned as dry in Alabama during 1946 and 20 wildcats were drilled and abandoned during 1947.

The Cretaceous province of the state continued to attract most of the activity, principally because Alabama's only oil field and those closest to its border in Mississippi are producing from sands in the Upper Cretaceous.

Though no new oil was produced by these wells they added materially to the limited subsurface knowledge of the state.

Nine new Eutaw sand wells were added to the Gilbertown field, Choctaw County, during 1946 and 1947. During 1946 the field produced 382, 903 barrels of oil from 27 wells and in 1947 production from 33 wells was 463,776 barrels. A total of 1,089,560 barrels had been produced from this field by the end of 1947.

There has been a substantial decrease in geophysical and core-drill work in Alabama, especially during 1947. The gravity meter was the chief casualty due to the fact that most companies have completed their desired coverage with this type of survey.

Table I gives a comparison of the various types of surveys by crew weeks work during the past 3 years.

TABLE I

	Core Drill	*Gravity Meter*	*Magnetometer*	*Seismograph*	*Total*
1945	242	515	56	286	1,099
1946	182	432	31	194	839
1947	159	180	18	119	476

FLORIDA

In 1946 there were 21 wildcat wells drilled and abandoned in Florida, while 25 were drilled and abandoned in 1947.

Two of these wells encountered oil showings of sufficient consequence to justify setting casing for production tests.

O. D. Robinson's State No. 1 in Monroe County, was drilled to the total depth of 12,051 feet after which casing was cemented at 10,480 feet to test heavy black oil showings which were noted in tight dolomite and limestone of probable Glen Rose age. The well was abandoned following several tests of perforated interval from 10,168 feet to 110,363 feet which showed salt water with some heavy black oil.

Six miles northwest of the Sunniland field in Collier County, the Humble Oil and Refining Company drilled its Lee Cypress Company No. 3 to 11,943 feet and set casing at total depth. Tests were made of several sections between 11,312 feet and 11,888 feet and the well was abandoned, following recoveries of salt water with traces of oil.

All of the wildcat wells drilled in Florida should be considered as significant as they are furnishing data on stratigraphy which will be of value in later geophysical and drilling exploration.

Table II lists the wells which are believed to have stopped in "basement."

TABLE II

County	*Location*	*Well*	*Total Depth (Feet)*	*Formation Penetrated*
Alachua	23-8S-18E	Tide Water, Cato 1	3,150	Paleozoic
Alachua	33-7S-19E	Tide Water, Parker 1	3,219	Paleozoic
Alachua	24-9S-21E	Tide Water, Phifer Est. 1	3,228	Paleozoic
Baker	21-1N-20E	Hunt, Hunt 1	3,349	Paleozoic
Bay	8-3S-12W	Pure, International Paper Co. 1	4,960	Cretaceous
Bradford	15-6S-20E	Tide Water, Wiggins 1	3,167	Paleozoic
Clay	4-6S-25E	Humble, Foremost Prop. 1	5,862	Paleozoic
Dixie	5-11S-11E	Stanolind & Sun Perp. Forest Inc. 1	7,510	Paleozoic
Dixie	8-8S-14E	Sun, Langston 1	3,671	Paleozoic
Flagler	8-11S-28E	Humble, Campbell 1	4,632	Igneous rock
Gilchrist	15-9S-15E	Sun, Adams *et al.* 1	3,748	Paleozoic
Hernando	19-23S-18E	Ohio, Hernasco Corp. 1	8,472	Paleozoic
Highlands	34-38S-29E	Humble, G. C. Carlton Est. 1	12,985	Igneous
Hillsborough	7-31S-22E	Humble, Jameson 1	10,125	Granite
Lafayette	25-6S-12E	Sun, Crapps 1	4,133	Paleozoic
Levy	16-15S-13E	Coastal Petroleum, Ragland 1	5,850	Paleozoic
Levy	31-14S-17E	Sun, Goethe 1	3,997	Paleozoic
Marion	16-16S-23E	Sun, Camp *et al.* 1	4,637	Igneous
Osceola	10-27S-34E	Humble, Carroll 1	8,044	Granite
Osceola	12-31S-33E	Humble, Haymen 1	8,798	Rhyolite
Putnam	19-10S-25E	Sun-Seaboard, Roberts 1	3,327	Paleozoic
Suwannee	31-5S-15E	Sun, Odom 1	3,157	Paleozoic
Suwannee	28-2S-15E	Sun, Tillis 1	3,568	Paleozoic
Volusia	11-17S-31E	Sun, Powell Ld. Co. 1	5,958	Diorite

TABLE III

	Core Drill	*Gravity Meter*	*Magnetometer*	*Seismograph*	*Total*
1945	425	698	145	148	1,416
1946	180	260	33	62	535
1947	190	14	0	45	246

Five wells were drilled in the Sunniland field, Collier County, during the past 2 years. Two producers were added in 1946 and 2 producers and 1 dry hole in 1947.

Production for the field, which is from the Sunniland limestone of probable Glen Rose age, amounted to 56,863 barrels in 1946 and 259,136 barrels in 1947. The close of 1947 showed 5 producing wells in the field and a total cumulative production of 59,694 barrels.

Geophysical and core-drill work in the state showed a decided decline, especially in gravity meter, from the 1945 high.

Table III gives a record of crew weeks worked on various methods during the last 3 years.

GEORGIA

Georgia retained its cellar position in the district by scoring 3 wildcats drilled and abandoned in 1946 and 5 drilled and abandoned in 1947.

Table IV lists the wells considered to have penetrated "basement." However every wildcat drilled in Georgia is important in that it adds to the limited subsurface information on the state.

TABLE IV

County	*Location*	*Well*	*Total Depth (Feet)*	*Formation Penetrated*
Appling	Lot 552, District 2	Felsenthal & Weatherford, Bradley 1	4,106	Metamorphic
Clinch	Lot 373, District 12	Sun Oil, Barlow 1	3,847	Paleozoic
Echols	Lot 532, District 13	Hunt Oil, Superior Pine 3	4,003	Paleozoic

Core drill and geophysical exploration, with the exception of seismograph work was reportedly abandoned in the state during 1947.

Table V gives crew weeks worked by each method.

TABLE V

	Core Drill	*Gravity Meter*	*Magnetometer*	*Seismograph*	*Total*
1945	5	163	47	0	215
1946	3	49	30	0	82
1947	0	0	0	27	27

MISSISSIPPI

In 1946 there was a total of 81 wildcats drilled in Mississippi which led to the discovery of 3 new fields and 5 shallow piercement salt domes, while a total of 92 wildcats drilled in 1947 resulted in the discovery of 3 new fields, 3 shallow piercement salt domes, and 2 deep piercement salt domes.

NEW FIELDS

1. *La Grange.*—The La Grange field is in central Adams County, approximately 6 miles southeast of Natchez and was discovered by the Sohio Petroleum Company—Roeser and Pendleton's Baker-Maier No. 1, Sec. 34, T. 6 N., R. 2 W., which was completed, February 18, 1946.

Previous to the discovery two "high" wells were drilled about 2 miles southwest on seismic information.

Additional seismograph work led to the locating and drilling of the Baker-Maier No. 1. The well was cored and drilled to the total depth of 10,673 feet, and had showings of oil in two Wilcox sands at 4,630 feet and 6,213 feet and possible gas-condensate and oil in the basal Tuscaloosa from 10,528 to 10,546 feet.

Casing was set and perforated from 10,544–10,549 feet and the well put on production, flowing 97 barrels of 39.2° A.P.I. gravity oil and 400 barrels of salt water a day through ¼-inch tubing choke.

Oil production declined and salt water increased steadily until July, 1946, when the Tuscaloosa production was abandoned and the well was plugged back and recompleted as an oil well in the 6,200-foot zone.

At the close of 1947 there were 47 wells producing from the 6,200-foot zone and one well dually completed in this and the 4,600-foot zone.

A second Tuscaloosa test, the Sinclair-Wyoming's De Marco No. 1, approximately 1½ miles west of the discovery well was drilled and abandoned, with only slight showings, during October, 1947.

Reserves in the Wilcox sections are estimated at approximately 10,000,000 barrels but the potentialities of the Tuscaloosa are still to be determined.

2. *Pine Ridge.*—The Pine Ridge field is in northern Adams County, 8 miles northeast of the city of Natchez, and was discovered by the successful completion of the Phillips Petroleum Company's Artman No. 1, Sec. 36, T. 8 N., R. 2 W., on December 5, 1946.

The first well to be drilled on this gravity-seismograph prospect, R. L. Fisher's Lambdin No. 1, also in Section 36, was abandoned in February, 1942, at the total depth of 7,104 feet, in basal Wilcox. Extensive side wall sampling revealed some slight showings of oil which were not considered sufficient to justify production test.

Despite these showings and the "high" Wilcox top in the Lambdin well no additional wells were drilled on the prospect until September, 1945, when the Phillips Petroleum Company located its Davey No. 1, after additional seismograph work in Sec. 46, T. 8 N., R. 2 W., 1 $\frac{5}{16}$ miles due west of the Lambdin No. 1.

No oil showings were recognized in the Wilcox and the well was drilled to the total depth of 10,514 feet in the Washita-Fredericksburg.

Cores taken in the lower Tuscaloosa ("Massive sand") had sufficient showings to justify setting casing, but low over-all fluid volume and high salt-water percentage on each of several tests resulted in abandonment, April 25, 1946.

On November 1, 1946, operations were begun on the Pine Ridge discovery well, located 2,000 feet south of Fisher's Lambdin No. 1.

Oil sand was cored from 5,619 to 5,633 feet in the Wilcox, casing was set, and the well completed, flowing 113 barrels of 41° gravity oil a day through 10/64 inch tubing choke.

A fourth test, Phillip's Artman No. 2, east offset to Artman No. 1, was aban-

doned April 4, 1947, at the total depth of 10,276 feet, after finding both the 5,600-foot Wilcox and "Massive" Tuscaloosa below the probable oil-water contacts.

At the close of the year, R. L. Fisher was drilling his Natchez Airport No. 1, 1½ miles south of the discovery well.

3. *Kings.*—The Kings field is in central Warren County, approximately 6 miles northeast of Vicksburg. It was discovered by the Magnolia Petroleum Company's Pidgeon No. B-2, Sec. 27, T. 17 N., R. 4 E., on March 12, 1946.

Following geophysical work Magnolia drilled 7 core tests in 1941 and 1942, the first of which discovered the Kings salt dome but received additional attention because of the heavy asphaltic oil showings in the top of the Wilcox.

Similar showings were recognized in the other six tests but none were of commercial significance.

In 1945, Magnolia's Feld Estate No. 1, Sec. 3, T. 16 N., R. 4 E., was drilled to a total depth of 8,262 feet in Tuscaloosa on the south flank of the dome and was abandoned with no shows.

There was no further exploratory drilling at Kings until the discovery was drilled.

Gas sands were cored in the Sparta and Zilpha (Cane River). Casing was set and perforated in the latter and the well completed on March 12, 1946, with an open flow potential of 7,200,000 cubic feet of gas per day.

Two wells have been completed subsequent to be discovery, one as a dry hole and the other one as an 11,500,000-cubic-foot gas well.

The principal significance of the Kings field discovery is the fact that it is one of three shallow salt-dome structures to be productive of gas inMississippi. The other two are the Bruinsburg field in Claiborne County and the McBride field in Jefferson County.

4. *McBride.*—The McBride field was discovered by the California Company's Greer *et al.* No. 2, Sec. 10, T. 9 N., R. 4 E., in the northeast corner of Jefferson County.

Following gravity-meter work, the area was detailed by siesmograph, and the California's Greer *et al.* No. 1 was drilled to the total depth of 5,616 in Wilcox where it was abandoned with no showings reported.

Geophysical interpretation of a shallow dome was confirmed, however, by the abnormal structural position of the well and the extreme dips observed in cores.

With this encouragement, Greer *et al.* No. 2 was drilled and encountered cap rock at 1,865 feet and salt at 2,205 feet. After drilling to the total depth of 2,225 feet, casing was set and perforated from 1,452 to 1,462 feet to test gas showings in the Cockfield, and there the well was completed, flowing 407,000 cubic feet of gas a day through 13/64-inch tubing choke.

As in the case of the Kings field, the most significant fact about the McBride discovery is the production of gas on a shallow salt-dome structure.

5. *Oldenburg.*—The Oldenburg field is in the northwest part of Franklin County, 22 miles east of Natchez. The discovery well, Hawkins and Graham's Lehmann No. 1, Sec. 27, T. 7 N., R. 2 E., located on a rather weak gravity-meter anomaly was drilled and cored to the total depth of 10,753 feet in the Washita-Fredricksburg.

A successful drill-stem test had indicated a probable commercial producer from 10,548 to 10,559 feet where oil sand had been cored.

Considerable difficulty was encountered during testing, as casing had been inadvertently cemented at 10,552 feet which necessitated the setting of a 5½-inch Securaloy liner through the sand.

The well was completed on October 19, 1947, flowing 153 barrels of 37° A.P.I. gravity and 51 barrels of salt water through 3/16-inch tubing choke.

TABLE VI

1946 AND 1947 SALT-DOME DISCOVERIES

Name	*County*	*Operator*	*Well*	*Location*	*Total Depth (Feet)*	*Remarks*
Hazelhurst	Copiah	Stanolind	Huntington 1	28-1N-1W	1,650	Cap rock, 1,460 Anhydrite, 1,640
Utica	Copiah	Sun Oil *et al.*	Little 1	8-2N-2W	3,143	Cap rock, 2,630 Salt, 3,135
Dry Creek	Covington	Sippiala Corp.	McRaney 1	21-8N-17W	2,476	Sulphur test
Petal	Forrest	Sippiala Corp.	Wilson 1	25-5N-13W	1,802	Sulphur test
McBride	Jefferson	California Co.	Greer 2	10-9N-4E	2,225	Salt 2,205 (See text)
Eagle Bend	Warren	Amerada	Dabney-Bonelli 1	9-18N-2W	5,207	Salt, 4,505 (See text)
Brownsville	Hinds	Gulf Refining Co.	Trotter 1	15-7N-2W	5,975	Salt, 5,940 (See text)
Eminence	Covington	Humble Oil & Ref. Co.	Leroy 1	5-7N-14W	2,515	Anhydrite, 2,114 Salt, 2,442
Heidelberg	Jasper	Danciger Oil & Ref. Co.	Simmons 1	36-1N-12E	9,630	Anhydrite, 9,511 Salt, 9,538
Ovett	Jones	Gulf Refining Co.	Majors 1	29-6N-11W	13,251	Salt, 13,152 (See text)

At the end of the year a west offset was being drilled.

6. *Yellow Creek.*—The Yellow Creek field is in the northwest part of Wayne County, 5 miles southeast of the Eucutta field. It was discovered by Hughes and Sistrunk's G. M. & O. R. R. Company No. 1, Sec. 24, T. 9 N., R. 8 W.

This discovery can be credited to subsurface geology for it was from data obtained from several dry holes drilled on the prospect, the first in 1934, that the Hughes-Sistrunk location was made.

Oil sands were cored in the three upper Eucutta field producing zones of the Eutaw formation: the Morrison, City Bank, and Stanley.

After coring to the total depth of 5,152 feet in oil sand, casing was cemented and perforated and the well completed on December 21, 1947, pumping 183 barrels of 19.5° A.P.I. gravity oil per day with a shake-out ranging from 2 per cent to 20 per cent basic sediment and water.

DEVELOPMENT IN FIELDS DISCOVERED PRIOR TO 1946

The rejuvenation of the Brookhaven and Mallalieu fields of Lincoln County was probably the most important development of the past 2 years in Mississippi.

Brookhaven.—The Brookhaven field, which had remained a one-well field since its discovery in 1943, was extended 1½ miles southwest during the latter part of 1945. Encouraged by this extension and faced with early lease expiration, operators were forced to begin the most intensive big-rig boom yet experienced in the state. Completed at an average depth of 10,350 feet, a total of 133 producers and 18 dry holes had been drilled in Brookhaven at the close of 1947. On January 1, 1948, there were 10 active locations in the field.

Mallalieu.—The history of development at Mallalieu is similar to that of Brookhaven. Discovered in 1944, it remained a 2-well field from 1945 until August 4, 1946, when The California Company's Mary McDaniel No. 1, Sec. 17, T. 6 N., R. 8 E., 2¼ miles southwest of production, was completed in the lower Tuscaloosa, flowing 486 barrels of 39.3° A.P.I. gravity oil a day through 3/16-inch tubing choke. At the close of 1947 there were 46 producers, 15 dry holes, and 19 active locations in the field.

OTHER INTERESTING WILDCATS

During 1946 and 1947 several wildcats were drilled which, though they did not discover new fields, are considered worthy of mention.

All of the wells listed were drilled following gravity-meter or seismograph work.

The Danciger Oil and Refining Company's G. W. Armstrong No. 1, Sec. 5, T. 4 N., R. 2 W., Wilkinson County, drilled to the total depth of 11,355 feet in the Comanche, cored 6 feet of oil sand at 11,079 feet in the basal Tuscaloosa. This showing did not warrant a test and the well was abandoned, May 27, 1946.

The Superior Oil Company's Cassie Bradford No. 1, Sec. 1, T. 3 N., R. 13 W., Forrest County, drilled into possible Travis Peak to the total depth of 15,726 feet, a depth record for Mississippi. Casing was set and several zones were tested in the Paluxy and Glen Rose. Considerable 33°–38° A.P.I. gravity oil was swabbed after perforating opposite three zones, 13,305–13,335 feet, 13,375–13,420 feet, and 12,468–12,490 feet. The fill-up rate on all tests was too slow to justify setting pumping equipment and the well was abandoned, June 6, 1947.

The Humble Oil and Refining Company's C. Tullos No. 1, Sec. 12, T. 1 N., R. 18 W., Marion County, was drilled to the total depth of 10,993 feet and casing set to test showings encountered during drilling in the lower Tuscaloosa. Four separate intervals were tested with three giving up salt water and some oil.

Two-inch tubing was run for a production test on the fourth interval, 8,996–9,003 feet, and the well started flowing at the rate of 1,460,000 cubic feet of gas and 5 barrels of 57° A.P.I. gravity condensate a day through ¼-inch tubing choke, tubing pressure 1,050 pounds. Gas volume and pressure declined and salt-water

encroachment increased during several days of testing, and the well was finally abandoned, June 11, 1947.

The Amerada Petroleum Company's Dabney-Bonelli No. 1, Sec. 9, T. 18 N., R. 2 E., Warren County, discovered the Eagle Bend salt dome, but is probably more interesting because of the oil showings noted in the Wilcox during drilling. With the top of the salt encountered at 4,505 feet, the well was drilled to the total depth of 5,207 feet. Casing was set and two intervals tested; 3,600–3,606 feet and 3,612–3,617 feet. Salt water was recovered on both tests and the well was abandoned, June 15, 1947.

A second well, Amerada's State No. 1, Sec. 16, T. 18 N., R. 2 E., approximately ½ mile south of the Dabney-Bonelli No. 1, was abandoned, August 10, 1947, at the total depth of 4,425 feet, in anhydrite.

Two cored sand sections, 3,627–3,637 feet and 3,875–3,883 feet, respectively, showed slight oil staining but produced only salt water when tested.

The Gulf Refining Company's R. W. Trotter No. 1, Sec. 15, T. 7 N., R. 2 W., Hinds County, discovered the Brownsville dome when it drilled into salt at 5,940 feet. The well was cored almost continuously after encountering oil showings in the top of Cretaceous (Gas rock). During the course of coring and drilling to the total depth of 5,975 feet, showings of sufficient importance were encountered to justify making ten drill-stem tests, seven of which recovered oil in varying quantities with a maximum of 45 feet. Casing was set and two of the most promising sands in the Tuscaloosa at 5,418 feet and 5,484 feet, respectively, were tested. Low over-all fluid recoveries plus a high percentage of salt water resulted in abandonment, November 18, 1947.

This well is of special interest as it is the only one of several drilled into the steeply dipping beds on the flanks of piercement-type salt domes in this district which has had any substantial showings of oil.

At the close of the year the Gulf was drilling at 2,800 feet in its Trotter No. 2 located 115 feet north and 164 feet west of No. 1.

The Union Sulphur Company's Earline Parker No. 1, Sec. 31, T. 10 N., R. 10 W., Jones County, was drilled and cored to the total depth of 7,280 feet, in the Comanche, and casing was cemented to test two sands which had contained heavy black oil in cores. The first test through perforations from 6,918 to 6,921 feet recovered salt water cut with oil. Perforations were squeezed off and casing perforated from 5,438 to 5,455 feet.

Pumping equipment was installed on September 12, 1947, and the well produced at the rate of 10 barrels of 10° A.P.I. gravity oil a day plus 10 per cent salt water. At the end of the year, permit for abandonment had been requested.

J. R. Frankel's Eisner Estate No. 1, Sec. 24, T. 11 N., R. 4 W., Yazoo County, was cored and drilled to the total depth of 7,380 feet in the Comanche.

Coring and side-wall sampling recovered sands containing heavy asphaltic oil in several intervals from 6,508 to 7,680 feet in lower Tuscaloosa.

Bridge plug was set in open hole to test the best of these sands, from 6,370 to 6,750 feet, but when only mud and salt water were recovered the well was abandoned, August 13, 1947.

Gulf Refining Company's L. L. Majors No. 1, Jones County, Sec. 29, T. 6 N., R. 11 W., was in the final stages of completion at the close of 1947.[3] It was drilled to the total depth of 13,251 feet in salt, discovered the Ovett dome, and set two records for Mississippi in that it found salt at a greater depth and cut more cores (376) than any other well drilled in the state. First showings of heavy black oil were noted in a core at 7,294 feet in the basal Eutaw. Several sands showing this

TABLE VII

Field	*Discovery Date*	*Accumulated Total Barrels*	
		1946	*1947*
Tinsley	9- 5-39	94,243,829	100,979,226
Heidelberg	1-30-44	8,443,219	13,471,705
Pickens	4- 9-40	8,379,975	9,899,769
Cranfield	10- 6-43	7,114,156	12,579,768
Eucutta	10 -7-43	4,906,202	7,420,683
Baxterville	11-18-44	1,326,877	6,293,255
Brookhaven	7- 8-43	1,224,133	5,641,696
Langsdale	1-18-45	472,902	839,907
Mallalieu	8-24-44	321,602	2,434,053
Gwinville	8-11-44	256,470	556,821
Fayette	8-14-45	152,623	342,458
Carthage Point	2-13-43	143,686	514,192
Hub	3- 3-45	107,616	254,411
Cary	9-16-41	52,945	59,324
Flora	9- 8-43	45,009	60,051
La Grange	2-18-46	21,604	986,750
Soso	3- 1-45	3,320	10,533
Pine Ridge	12- 5-46	3,180	43,294
Quitman	10-21-45	926	2,490
Yellow Creek	12-21-47	—	1,565
Totals		127,220,274	162,409,951

type of oil were cored in the upper and lower Tuscaloosa and 10 separate drill-stem tests recovered heavy black oil in varying amounts.

Numerous oil showings were also encountered while coring the Paluxy and Glen Rose sections, and casing was finally set at 13,157 feet after salt had been encountered at 13,152 feet. Several intervals were perforated and tested between 12,011 and 13,082 feet in the lower Paluxy and Glen Rose. On a 4-day test, ending December 30, 1947, the well flowed an average of 101 barrels of 31.7° A.P.I. gravity oil a day through ¼-inch tubing choke. Flowing pressure declined steadily and pumping equipment was to be installed.

[3] The Majors No. 1 was completed January 5, 1948 pumping at the rate of 214 barrels of 31.3° A.P.I. gravity oil a day through perforations from over-all interval 12,011 to 12,082 feet.

OIL AND GAS PRODUCTION

Accumulated total production from each of the oil and/or condensate fields in Mississippi for the years 1946 and 1947 is shown in Table VII.

During 1946 approximately 13 billion cubic feet of gas was produced from fields in the state while in 1947 approximately 40 billion cubic feet was produced.

EXPLORATION

Geophysical and core-drill work in Mississippi showed a steady decline from the 1945 figure.

Table VIII gives a comparison, by crew weeks worked, of the various methods employed in the state during the past 3 years.

TABLE VIII

	Core Drill	*Gravity Meter*	*Magnetometer*	*Seismograph*	*Total*
1945	354	1,316	33	2,506	4,209
1946	452	700	53	1,665	2,870
1947	250	360	73	1,156	1,839

CONCLUSION

It is not expected that there will be any increase in wildcat drilling during 1948 in any of the four states comprising the district.

A possible exception to this is Mississippi where considerable acreage was taken on 10-year term leases during the activity of 1938–1939 and after the discovery of the Tinsley oil field (Mississippi's first) in October, 1939.

These early lease expiration dates plus the difficulty of securing renewals at a reasonable figure may stimulate wildcat drilling provided, of course, that sufficient casing can be secured.

Geophysical work will probably decline, primarily because of the falling-off of gravity-meter surveys as some companies have completed or will complete their coverages during the year with this type of instrument.

Core-drill exploration should show an increase as this type of work appears to be gaining in popularity especially in the eastern part of the district, where porous to cavernous limestone at or near the surface makes seismograph work difficult.

Subsurface mapping will probably play a more important part in future exploration, especially in southeastern Mississippi where well control is becoming more plentiful.

As a result of the low discovery rate during the past 3 years, interest in the southeastern district has decreased considerably from the 1943–1944 boom.

It should be born in mind, however, that less than 1,000 wildcat wells have been drilled in Mississippi, and fewer than 300 in Alabama, Florida, and Georgia combined, during the past 47 years.

A coverage as thin as this definitely leaves the southeastern district in the frontier class in exploration as well as in geological knowledge.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 1077-1078, 1 TABLE

DEVELOPMENTS IN ATLANTIC COASTAL STATES BETWEEN NEW JERSEY AND NORTH CAROLINA IN 1947[1]

HORACE G. RICHARDS[2]
Philadelphia, Pennsylvania

ABSTRACT

During 1947, drilling activity along the Atlantic Coastal Plain declined. The most significant well was that drilled by Standard Oil Company of New Jersey in Pamlico Sound, Dare County, North Carolina. This was abandoned at a depth of 6,410 feet without any indication of oil or gas. Several dry wells were drilled by Carolina Petroleum Company in Pamlico and Craven counties, North Carolina. No drilling was reported from the Coastal Plain of New Jersey, Delaware, Maryland, or Virginia. One well was drilled in the Piedmont region of New Jersey, and one in extreme western Maryland. Activity continued in the Rose Hill field in Lee County in southwestern Virginia.

COASTAL PLAIN

During 1947, drilling activity on the Atlantic Coastal Plain was limited to the states of North Carolina, Georgia, and Florida. Records from the latter two states are covered by another report. The most significant well in North Carolina was that drilled by Standard Oil Company of New Jersey. This well was drilled in about 5 feet of water in Pamlico Sound, about 11 miles south of Wanchese, Roanoke Island, Dare County. The well was abandoned at a depth of 6,410 feet in the Lower Cretaceous.[3]

The Carolina Petroleum Company continued activity in eastern North Carolina and drilled four wells, all to basement, without finding any traces of oil or gas. Drilling activity in North Carolina is summarized in Table I.

TABLE I

County	*Location*	*Company*	*Name of Well*	*Elevation (Feet)*	*Depth (Feet)*
NORTH CAROLINA					
Craven	1 mi. E. Ellis Lake	Carolina Petroleum Company	Bryan No. 1	21	2,435
Dare	Pamlico Sound	Standard (N.J.)	Esso No. 2	21	6,410
Pamlico	1 mi. SW. Pamlico	Carolina Petroleum Company	N.C. Pulpwood No. 1	11	3,667
Pamlico	1½ mi. NE. N.C. Pulpwood No. 1	Carolina Petroleum Company	Atlas Plywood No. 1	11	3,430
Pamlico	1 mi. E. Merritt	Carolina Petroleum Company	Lindley No. 1	16	2,897

[1] Manuscript received, March 10, 1948. Presented by title before the Association at Denver, April 26–29, 1948.

[2] Associate curator of geology and paleontology, Academy of Natural Sciences of Philadelphia.

[3] Frederick M. Swain, *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 31, pp. 2054–60 (1947).

NEW JERSEY

During the spring of 1947, a well was started by the Van Horn Oil Company on the Martin Dolak farm at Millstone, Somerset Country. Drilling commenced in the red shales of the Brunswick formation of Triassic age. Drilling activity was suspended during the latter part of the year at a depth of about 1,500 feet, but it is understood that drilling will be resumed during 1948.

MARYLAND[4]

The Columbian Carbon Company of Charleston, West Virginia, drilled a well on the farm of Willis J. Durr in Garrett County, Maryland, approximately 2,700 feet east of the Maryland-West Virginia state line. Some gas blew in at 4,590 feet (in the Onondaga formation) but was soon exhausted. The well was completed in January 1948, at a depth of 5,259 feet.

VIRGINIA

Drilling continued in the Rose Hill field of Lee County, southwestern Virginia, and at the close of the year the production of this field was estimated at about 225 barrels per day, the most of which came from 15 wells. Seven new wells were drilled during 1947. Of these, four were dry and three produced from the Trenton formation. For further details, see paper by Philip Jenkins in this number of the *Bulletin*.

[4] The information on Maryland and Virginia is based on data obtained from William M. McGill, State geologist of Virginia, and F. H. Finn, of the Peoples Natural Gas Company, Pittsburgh, Pennsylvania.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE 1948), PP. 1079-1092, 1 FIG., 2 TABLES

DEVELOPMENTS IN CANADA IN 1947[1]

J. G. GRAY[2]
Calgary, Alberta
AND
F. L. FOURNIER[3]
Toronto, Ontario

ABSTRACT

The discovery of a major oil field at Leduc on the Central Plains of Alberta in February, 1947, accelerated drilling and exploration to the most active program ever to be undertaken in Western Canada. It also resulted in a complete revision of the oil and gas regulations pertaining to reservation and leasing of Crown lands under the administration of the Provincial Department of Lands and Mines. The Provincial Government introduced new limitations and modifications of the previous regulations. The total footage drilled in Alberta was 883,938 feet, resulting in 102 completed oil wells, 14 incomplete but probable oil wells, 33 gas wells, 75 dry holes, and one salt well. Besides the Leduc find an important discovery was made in the Lower Cretaceous strata at Bantry, southwest of the Princess field. Total oil production for the province amounted to 6,382,059 barrels of crude and 427,225 barrels of natural gasoline. Active exploration for gas was continued in Southern Alberta and important additions were made to the over-all gas reserves by new gas discoveries throughout the province. Seismic exploration proved to be the most popular exploration tool during the year, although various other methods, including surface geological studies, gravity work, magnetometer surveys, and structure drilling were employed on a comprehensive scale. Because of the discovery of lucrative production in the Devonian strata at Leduc most of the exploration efforts were directed to exploring for additional Devonian pools in the low-dip strata of the plains region. Less attention was paid to the foothills structures than had been the case in previous years. Several deep tests were made, however, in this geological province and a significant discovery of wet gas was made in the Pincher Creek area on the southwestern corner of the province. At the close of the year this well was undergoing additional testing.

In Saskatchewan an active drilling program surpassing all other years was conducted in the Lloydminster-Lonerock area where shallow Lower Cretaceous production of 18° gravity oil was being developed. The number of wells drilled in the province amounted to 105, accounting for a cumulative footage total of 204,485 feet. Of these, 89 were development wells and 10 were exploration wells in the Lloydminster field. Two wildcats were being drilled elsewhere in the Province at the end of the year. Total oil production for the year amounted to 535,033 barrels all from the Lloydminster-Lonerock field.

No deep drilling was undertaken in British Columbia during the year. One well was in a suspended state at a depth of 2,303 feet in the Lower Mainland area. Test drilling was conducted in the Peace of northeastern British Columbia. Some changes were made in the Provincial Petroleum and Natural Gas Act and Regulations. Approximately one and three-quarter million acres were applied for during the latter part of the year.

Considerable interest was aroused in the oil- and gas-producing possibilities of Manitoba. The regulations governing the disposal of oil and gas rights on Crown lands and the exploration, development and production of oil and gas in Manitoba were revised under the "Mines Act." Following this action, approximately 1,750,000 acres of Crown lands situated in the southwestern part of the province were reserved and leased during the year. Extensive seismic and surface geological studies were made by the Brandon Exploration Company, a subsidiary of the California Standard Company. Two wells were drilled for oil and gas by independent operators. One was abandoned at the top of the pre-Cambrian at the depth of 2,519 feet. The other was suspended at the depth of 1,540 feet.

Activities in the Northwest Territories were confined largely to the production of oil from Norman Wells. Total production for the year amounted to 297,256 barrels. Two shallow diamond-drill holes were drilled on the Hay River to depths of 918 and 351 feet, respectively.

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, April 8, 1948.

Many of the statistical data used in the preparation of this summary were provided by Floyd K. Beach, engineer, Petroleum and Natural Gas Conservation Board, Calgary. Many thanks are due him for his kindness in allowing access to his excellent recording of data.

[2] Administrative geologist, California Standard Company.

[3] Staff geologist, Imperial Oil Limited.

The decline in production of crude which had prevailed in Western Canada since 1942 was halted during the year. As a result of developments of Leduc and Woodbend the present domestic production rate should be doubled in a year. The Lloydminster field greatly expanded its production. New refinery capacity was set up at Lloydminster and a refinery to handle the Leduc production was being installed by the Imperial Oil Limited at Edmonton. Many companies not previously active in Canada set up offices to conduct aggressive exploration programs. Indications were that although 1947 had been a record year even greater activity was to be expected in all phases of the industry in 1948.

Exploratory drilling in Eastern Canada was mainly concentrated in southwestern Ontario where the search for new gas reserves accounted for 70 per cent of the wells.

A new gas field was discovered by the Imperial Oil Limited at Kimball, 11 miles south of Sarnia, Ontario, in the Salina formation.

An important test was drilled in the Minudie anticline near Amherst, Nova Scotia, by the Sun Oil Company. The well was abandoned as a dry hole in Mississippian rocks at 11,504 feet.

INTRODUCTION

This paper describes the oil and gas developments which have taken place throughout the Dominion of Canada during 1947. As in previous years the greatest activity took place in the Province of Alberta where the extensive exploration efforts of the Imperial Oil Limited were rewarded by the discovery of the Leduc oil field in February. Important increases in oil production were made in Saskatchewan where extensive drilling of the Lloydminster-Lonerock field was aggressively carried on by various independent companies. Production of oil continued at Norman Wells in the Northwest Territories. Increased interest was shown in the petroleum-producing possibilities of Manitoba and British Columbia.

Developments in Eastern Canada were largely confined to Ontario where attention was largely directed to increasing the gas reserves of the province. Some wildcat drilling was undertaken in the provinces of Quebec, New Brunswick, and Nova Scotia.

WESTERN CANADA

The area included in Western Canada consists of the provinces of British Columbia, Alberta, Saskatchewan, and Manitoba, as well as the Northwest Territories.

Oil production for the year was as follows.

Province	*Field*		*Production in Barrels*	*Total*
ALBERTA	Turner Valley	Crude	5,022,350	
		Natural Gasoline	427,225	
	Leduc		372,427	
	Conrad		202,929	
	West Taber		111,761	
	East Taber		93,475	
	Princess		106,920	
	Wainwright		18,325	
	Vermilion		138,401	
	Lloydminster		304,236	
	Miscellaneous		11,235	
				6,809,284
SASKATCHEWAN	Lloydminster-Lonerock			535,033
NORTHWEST TERRITORIES	Normal Wells			297,256
				7,641,573 barrels

The total production in Western Canada was 185,287 barrels greater than it was in 1946. It was the first year since 1942 that an increase was recorded. This was due to the discovery of the Leduc field and also the increased production from the Lloydminster area.

The total footage drilled for oil and gas in Western Canada during 1947 amounted to 1,093,751 feet. Drilling in Alberta accounted for 883,938 feet, resulting in 102 completed oil wells, 14 incomplete but probable oil wells, 75 dry holes, and one salt well. In all, 204,485 feet were drilled in Saskatchewan, most of which was in the Lloydminster field where 89 development wells and 10 exploration wells were drilled. Two wells were drilled in Manitoba, one to the depth of 2,519 feet and the other to the depth of 1,540 feet. Two shallow holes were drilled in the Northwest Territories.

NEW FIELDS DISCOVERED

LEDUC OIL FIELD

The most important development in Western Canada during the year was the discovery of the Leduc oil field in T. 50, R. 26 W., 4th Meridian, approximately 15 miles southwest of the city of Edmonton. The discovery well, Imperial's No. 1, was completed in Devonian dolomite at the total depth of 5,066 feet on February 13, 1947. At the close of the year 40 wells had been drilled in the field, 33 of these were completed as producing oil wells, one was a shallow gas well, and 6 were dry holes. Ten wells were drilling at the end of the year. Oil is produced from two porous zones in Upper Devonian dolomite. The upper porosity, called the D_2 zone, is encountered at an average depth of 5,000 feet. The second porous section, or D_3 zone, is found between depths of 5,150 feet and 5,400 feet. The origin of the porosity is not yet completely understood but the consensus favors the theory that the reservoir is a fossil coral reef. Within the area of the field the Lower Cretaceous strata lie directly on the Devonian. The uppermost beds of the Devonian (D_1 zone) consist of dolomite and limestone with local porosity. Gas and oil showings are encountered in these beds but no commercial production has yet been developed in them. The D_2 zone is approximately 150 feet thick. The distribution of porosity in this zone is variable and has been found to tighten on the east side of the present limits of the field. The discovery well was completed in this zone but the follow-up well, Imperial's Leduc No. 2, found the D_2 to be tight and drilled deeper to discover oil in the D_3 zone which is separated from the D_2 zone by the 160 feet of dark green shale. This latter porosity is the main producing zone of the field. Testing in some wells has yielded commercial oil flows in both zones.

The structure of the field so far developed appears to have the form of a rather broad structural nose. The axis of the nose trends northeast and southwest which is at right angles to the regional strike of the Cretaceous strata at the surface.

All of the wells produce by natural flow. Experimental conservation practices

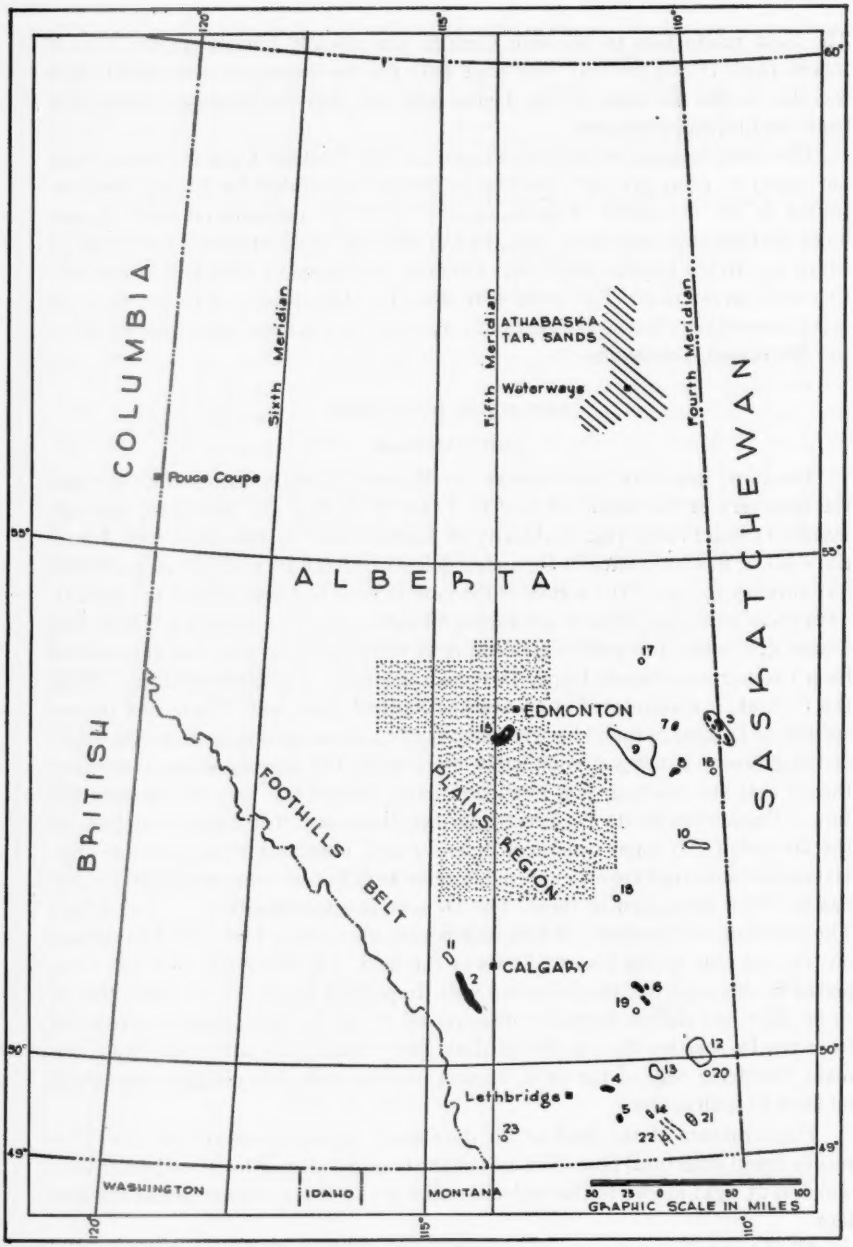

FIG. 1. See next page for description.

have limited D_2 production to 100 barrels per day, and D_3 production to 150 barrels per day per well. Potentials have been calculated to exceed 2,000 barrels per day in many of the wells. The gravity of the oil averages 39° A.P.I., and the average daily production at the end of the year was 3,220 barrels. Reserves at the present stage of development have been calculated to exceed 100,000,000 barrels.

The field was discovered as a result of extensive seismograph surveys undertaken in the area by the Imperial Oil Limited.

FIELD DEVELOPMENTS

TURNER VALLEY

Drilling activity and oil production continued to decline throughout the year. Thirteen locations were made in the field during the year. Eight of these were oil wells, one was abandoned as a dry hole, and four were drilling at the close of the year. Activity was concentrated largely on fill-in locations and attempts to extend the proved limits of the field. The completion of Home-Millarville No. 26, in Legal Subdivision 15 of Sec. 18, T. 21, R. 3 W., 5th Meridian, as a better than average producer extended the field $\frac{3}{8}$ mile northwest. The well was completed in the Madison limestone at the depth of 8,970 feet, after opening 110 feet of upper porous limestone and 50 feet of the lower porous. Initial flow tests prior to acidification indicated a yield of about 20 barrels hourly.

The dry hole, Royalite 86, was drilled in Legal Subdivision 12, Sec. 3, T. 21, R. 5 W., 5th Meridian. It was drilled for the purpose of investigating the producing possibilities of a possible fold indicated by the seismograph to occur beneath the east-side limestone fault block. The well reached the top of the east-side limestone at 8,951 feet which was 100 feet lower than the two deepest east-side limestone producers. It faulted out of limestone at 9,105 feet, encountered it again at 10,050 feet, and halted drilling to test at 10,080 feet. A drill stem test from 9,973–10,080 feet yielded 1,000 feet of light crude and 250 feet of salt water. Production casing was run but the well produced salt water with only a little showing of oil. It was finally abandoned at total depth of 10,145 feet.

The closest wildcat to be drilled near Turner Valley in the foothills belt was the Socony Vacuum's Stimson No. 1, located in Legal Subdivision 12, Sec. 5, T. 15, R. 2 W., 5th Meridian, 18 miles south of Turner Valley. It was located on the

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FIG. 1.—Map of Alberta, showing discovery wells drilled in 1947; producing oil fields and important gas fields. (1) Leduc oil and gas field; (2) Turner Valley oil and gas field; (3) Lloydminster oil field; (4) Taber oil field; (5) Conrad oil field; (6) Princess oil and gas field; (7) Vermilion oil field; (8) Wainwright oil fields; (9) Viking-Kinsella gas field; (10) Provost gas field; (11) Jumping Pound wet gas field; (12) Medicine Hat gas field; (13) Bow Island gas field; (14) Foremost-Pakowki-Manyberries gas field; (15) Imperial Leduc No. 1 (oil); (16) Highwood Dina No. 1 (oil); (17) St. Paul Syndicate No. 1 (gas); (18) Berry Creek No. 1 (gas); (19) Cal-Imperial Bantry 11-2-18-13 (oil); (20) California Standard-Dunmore Province 33-2 (gas); (21) McColl Frontenac-Union 7-13-5-6 (gas); (22) McColl Frontenac-Union 7-3-3-10 (gas); (23) Gulf Pincher Creek No. 1 (gas and oil).
Stippled pattern shows area of active leasing and drilling resulting directly from Leduc discovery.

basis of seismograph studies and was drilling at the depth of 2,691 feet at the close of the year.

Seismograph studies were in progress at the north end of the Turner Valley field during the latter part of the year.

LLOYDMINSTER

Lloydminster ranked second in activity during the year. Seventy-four wells were drilled in the Alberta part of the field and 89 were drilled in the Saskatchewan part. Three times as many wells were drilled in 1947 than in 1946 and oil production was four times greater than that of the previous year. The shortage of casing and tubing hindered development of this field to some extent throughout the year.

Oil is produced from sands in the upper part of the Lower Cretaceous strata which occur at an approximate depth of 2,000 feet. The wells average about 50 barrels per day with some wells making up to 160 barrels daily. The gravity of the oil ranges from 10° to 20° A.P.I. Development of the field to date has progressed in localized areas at Blackfoot, Lloydminster, Lone Rock and Dina, which are spread through a distance of 30 miles and across a width of 20 miles. Developments in 1947 indicate that this field is of major proportions and will rank as an important source of crude in Western Canada. A refinery with a capacity of 2,500 barrels per day was completed in July by the Husky Refinery Company. Their product is 50 per cent asphalt, 20 per cent light furnace oil, 5 per cent gasoline, 25 per cent Bunker "C" fuel oil.

PRINCESS

Activities in the Princess area were confined largely to the development of the Rundle limestone pool in the South Princess area. Three oil wells and one gas well were completed during the year. Three tests were abandoned, one well was testing, and another was drilling at the close of the year. Oil accumulation in the South Princess area has been found to be controlled by the occurrence of porosity developed near the contact of the Rundle limestone with a detrital zone situated between the Rundle limestone and the Lower Cretaceous strata. Wells completed in this porous section show initial productions of about 100 barrels per day. Some water is usually produced with the oil.

One deep test was abandoned at depth of 5,444 feet in the North Princess Devonian pool. This is the deepest test to be drilled in the field since the discovery well reached the pre-Cambrian basement complex in 1940.

CONRAD

No new wells were drilled in the Conrad field. This field produces oil from a sand at the base of the Ellis formation which is Jurassic in age.

TABER

Three wells were drilled and one was drilling in the West Taber pool by the end of the year. Two were completed as oil wells and one was abandoned.

No new wells were drilled in the East Taber pool. Plans were made for the re-pressuring of the East Taber pool and gas injection equipment was being installed at the close of the year.

IMPORTANT WILDCATS

Two wildcat wells were being watched with considerable interest at the end of the year. One of these was the California Standard-Imperial's Joint Venture Bantry well 11-2-18-13, located 12 miles southwest of the Princess field. The other was the Canadian Gulf's Pincher Creek well No. 1 drilled south of the town of Pincher Creek in the southwestern corner of Alberta.

The Bantry well was drilled to the total depth of 4,824 feet. After encountering water in the Devonian strata it was plugged back to 3,269 feet where formation tests had encountered encouraging oil and gas flows in a sand at the base of the Lower Cretaceous section. Completion of the well was in progress at the end of the year following very encouraging drill-stem tests.

The Pincher Creek well, which is situated in the structurally complex foothills belt, was undergoing testing at the end of the year and promising results were being obtained. The well was commenced on April 4, 1947, after extensive refraction-seismic shooting had been completed. The top of the Madison limestone was reached at the depth of 11,700 feet. Testing of the porosity in the upper 100 feet of the limestone yielded a gas flow at an estimated daily rate of 10,000 MCF with 1½ barrels of light crude. The pressure built up to 5,775 pounds per square inch in 5 minutes after the tester was closed. An additional 127 feet were drilled after this test was completed. At the end of the year the well was being prepared for a sustained flow test before being drilled deeper in search of additional porosity. The encouraging results obtained in this well will undoubtedly lead to increased activity in the foothills belt during 1948.

The Muskeg well No. 1 which was being drilled in the northern foothills northwest of Entrance, Alberta, was being watched with considerable interest. This well is being drilled by a group of major oil companies on a prominent surface structure. It is anticipated that the depth to the Madison limestone objective will exceed 10,000 feet. It was spudded on April 4th, 1947, and by the end of the year was drilling at a depth of 8,017 feet.

NATURAL GAS DEVELOPMENTS

The over-all gas reserves in the Province of Alberta were increased by new discoveries and by extension drilling of discovered fields. The principal development took place in the Foremost-Manyberries area in Southern Alberta, where an extensive gas development program was undertaken under joint arrangement

between the McColl Frontenac Oil Company and the Union Oil Company. It was announced that a reserve of 340,000,000 MCF had been developed in the area in this program. The gas-bearing strata are contained in the Bow Island sandy section of the lower part of the Colorado shale formation. In addition to extension of the reserve developed in the Foremost-Pakowki Lake field discovered in 1946, a new field was discovered near the town of Manyberries.

A large gas well, Shell 5-7-1, was completed by the Shell Oil Company on the Jumping Pound structure in the foothills 40 miles west of Calgary. Considerable condensate was found to be present with the gas. The porous producing zone is 100 feet thick near the top of the Madison limestone. This is the third gas well to be completed by this company on the structure and it seems likely that a large reserve of gas is present. The 5-7-1 well was drilled to the total depth of 14,443 feet and was plugged back to the Madison gas zone after testing the Devonian strata and penetrating to the top of the Cambrian. The well passed through a fault while drilling in the Banff formation and faulted back to the Madison limestone. The top of the Devonian was reached at the depth of 12,229 feet, and the Cambrian was topped at 14,205 feet. This is the deepest test drilled to date in Western Canada and in addition to the results obtained in the Madison was an important test so far as the Devonian strata are concerned.

Considerable interest was aroused in the latter part of 1947 about the possibility of exporting natural gas from Alberta to northwestern United States and to Eastern Canada. It was reported that pipe-line surveys had been made and that negotiations would be opened to obtain approval to export gas from the province.

GENERAL

The record activity which took place in Alberta and Saskatchewan during 1947 was the greatest ever observed in these provinces. In Alberta the cumulative total of holes drilled for oil and gas since the inception of drilling in the province on the Athabaska River in August, 1894, stands at 1,788 holes drilled to the end of 1947. Of these, 706 had oil or oil and water, 307 were gas wells, and 775 were dry holes. The prospects for additional discoveries during 1948 appear brighter than ever before. Geophysical prospecting, particularly the seismic method, has become the most popular means of exploration. This tool has had particular success in the complicated foothills belt where pre-drill estimates of the Madison objective, based on prediction from seismic data, have been confirmed by drilling within close limits of error. On the plains it is credited with the discovery of the Leduc field. At the end of the year there were 24 geophysical parties operating in the province. It was expected that this number would be increased appreciably in 1948.

Important changes were made in the regulations for the administration of petroleum and natural-gas rights on Crown lands within the various provinces. These regulations have an important bearing on exploration activities since the bulk of the mineral rights in Canada are held by the Crown and administered by

Wildcat Wells Completed in Western Canada, 1947

Well	*Location Lsd-Sec-Twp.Rge.Mer.*	*Depth in Feet*	*Strata Reached*	*Results*
Alberta Foothills				
Shell 5-7-I	Lsd. 5-7-25-4 W. 5th	14,443	Cambrian	Gas and condensate
Southern Plains				
Taber Jensen 82-8-B	Lsd. 4-8-9-16 W. 4th	3,250	Rundle ls.	Abandoned
Dunmore Province 33-2-11-5	Lsd. 7-2-11-5 W. 4th	4,607	Devonian	Ellis gas well
Princess C.P.R. 64-11	Lsd. 6-11-19-12 W. 4th	3,490	Rundle ls.	Abandoned
Princess C.P.R. 86-23	Lsd. 12-23-19-12 W. 4th	3,490	Rundle ls.	Abandoned
Princess C.P.R. 14-22-A	Lsd. 8-22-20-12 W. 4th	5,444	Paleozoic	Abandoned
Princess Brooks Syndicate C.P.R. #3	Lsd. 3-36-18-12 W. 4th	3,545	Rundle ls.	Abandoned
Juno Province 54-18	Lsd. 6-18-10-12 W. 4th	3,195	Rundle ls.	Abandoned
Brooks Province 88-28	Lsd. 13-28-19-14 W. 14th	4,850	Devonian	Abandoned
Bantry C.P.R. 11-2-18-13	Lsd. 1-2-18-13 W. 4th	4,824	Devonian	Basal Cretaceous Oil well
Crowfoot 1	Lsd. 14-33-20-19 W. 4th	4,466	Rundle ls.	Gas well
McLeod Del Bonita 1	Lsd. 13-14-1-21 W. 4th	4,989	Madison ls.	Abandoned
National Del Bonita 1	Lsd. 9-13-1-22 W. 4th	5,008	Madison ls.	Oil well
Foremost Province 13-17	Lsd. 8-17-5-11 W. 4th	4,107	Devonian	Abandoned
McColl Frontenac-Union 10B-22	Lsd. 10-22-1-7 W. 4th	2,511	Bow Island ss.	Abandoned
McColl Frontenac-Union 5-17	Lsd. 5-17-1-8 W. 4th	3,358	Bow Island ss.	Probable gas well
McColl Frontenac-Union 10B-19	Lsd. 10-19-2-7 W. 4th	2,329	Bow Island ss.	Abandoned
McColl Frontenac-Union 7C-32	Lsd. 7-32-2-8 W. 4th	2,103	Bow Island ss.	Abandoned
McColl Frontenac-Union 7C-27	Lsd. 7-27-2-10 W. 4th	1,863	Bow Island ss.	Abandoned
McColl Frontenac-Union 10B-30	Lsd. 16-30-2-10 W. 4th	1,989	Bow Island ss.	Abandoned
McColl Frontenac-Union 7C-34	Lsd. 7-34-3-9 W. 4th	2,202	Bow Island ss.	Gas well
McColl Frontenac-Union 7C-31	Lsd. 7-31-3-6 W. 4th	2,290	Bow Island ss.	Abandoned
McColl Frontenac-Union 7C-3	Lsd. 7-3-3-10 W. 4th	2,001	Bow Island ss.	Gas well
McColl Frontenac-Union 11A-13	Lsd. 11-13-3-10 W. 4th	2,044	Bow Island ss.	Abandoned
McColl Frontenac-Union 6-23	Lsd. 6-23-4-4 W. 4th	3,000	Rundle ls.	Abandoned
McColl Frontenac-Union 11A-21	Lsd. 11-21-4-5 W. 4th	2,763	Bow Island ss.	Abandoned
McColl Frontenac-Union 11A-29	Lsd. 11-29-4-5 W. 4th	2,850	Bow Island ss.	Probable gas well
McColl Frontenac-Union 10B-25	Lsd. 10-25-4-6 W. 4th	2,720	Bow Island ss.	Abandoned
McColl Frontenac-Union 10D-9	Lsd. 10-9-4-9 W. 4th	2,237	Bow Island ss.	Gas well
McColl Frontenac-Union 7C-1	Lsd. 7-1-4-10 W. 4th	2,200	Bow Island ss.	Abandoned
McColl Frontenac-Union 6D-21	Lsd. 6-21-4-10 W. 4th	2,273	Bow Island ss.	Gas well
McColl Frontenac-Union 6D-25	Lsd. 6-25-4-10 W. 4th	2,244	Bow Island ss.	Gas well
NcColl Frontenac-Union 7C-6	Lsd. 7-6-5-5 W. 4th	2,663	Bow Island ss.	Gas well
McColl Frontenac-Union 6D-17	Lsd. 6-17-5-5 W. 4th	2,770	Bow Island ss.	Gas well
McColl Frontenac-Union 7-13	Lsd. 7-13-5-6 W. 4th	2,703	Bow Island ss.	Gas well
McColl Frontenac-Union 10B-15	Lsd. 10-15-5-6 W. 4th	2,570	Bow Island ss.	Abandoned
McColl Frontenac-Union 6D-27	Lsd. 6-27-5-6 W. 4th	2,540	Bow Island ss.	Abandoned
McColl Frontenac-Union 6-4	Lsd. 6-4-5-10 W. 4th	2,307	Bow Island ss.	Abandoned
McColl Frontenac-Union 6D-23	Lsd. 6-23-6-5 W. 4th	3,250	Rundle ls.	Abandoned
McColl Frontenac-Union 13-5	Lsd. 13-5-6-7 W. 4th	3,308	Rundle ls.	Aabndoned
McColl Frontenac-Union 10B-23	Lsd. 10-23-6-10 W. 4th	2,407	Bow Island ss.	Abandoned
McColl Frontenac-Union 10B-22	Lsd. 10-22-7-9 W. 4th	3,295	Rundle ls.	Abandoned
East-Central Alberta				
Edgerton Province 64-24	Lsd. 6-24-45-4 W. 4th	2,514	Devonian	Suspended
Dinalta 1	Lsd. 10-25-44-1 W. 4th	1,825	Low Cretaceous	Oil well
Highwood Dina 1	Lsd. 9-12-45-1 W. 4th	1,659	Low Cretaceous	Oil well
Husky McLaughlin 16-34	Lsd. 16-34-47-2 W. 4th	2,322	Low Cretaceous	Abandoned
Imperial Greenglade 1	Lsd. 5-16-41-1 W. 4th	3,274	Devonian	Abandoned
St. Paul Syndicate 1	Lsd. 10-4-58-9 W. 4th	1,578	Low Cretaceous	Gas well
Berry Creek 1	Lsd. 3-9-31-14 W. 4th	4,289	Devonian	Rundle gas well
Consumers Co-Op Refinery 2	Lsd. 3-13-31-15 W. 4th	5,009	Devonian	Abandoned
Husky Earlie 1-11-36	Lsd. 11-36-48-3 W. 4th	2,202	Low Cretaceous	Abandoned
Husky Paradise 1-11-11	Lsd. 11-11-48-2 W. 4th	2,452	Devonian	Suspended
Husky S. Kitscoty 1-3-14	Lsd. 3-14-50-3 W. 4th	1,923	Low Cretaceous	Suspended
Husky N. Kitscoty 1-4-18	Lsd. 4-18-51-2 W. 4th	1,924	Low Cretaceous	Suspended
Apex Lloydminster 1	Lsd. 13-11-52-2 W. 4th	2,799	Devonian	Suspended
West-Central Alberta				
Shunda B1	Lsd. 5-20-55-20 W. 4th	3,686	Devonian	Abandoned
Anglo Home C & E 1	Lsd. 9-29-46-20 W. 4th	5,241	Devonian	Abandoned
Canadian Gulf Stony Plain 1	Lsd. 14-9-52-26 W. 4th	6,568	Devonian	Abandoned
Imperial Looma 1	Lsd. 4-10-50-23 W. 4th	6,500	Devonian	Abandoned
Imperial Leduc 1	Lsd. 5-22-50-26 W. 4th	5,066	Devonian	Oil well
McColl Frontenac-Union 4-11	Lsd. 4-11-45-25 W. 4th	6,500	Devonian	Abandoned
McColl Frontenac-Union 3-22	Lsd. 3-22-46-23 W. 4th	5,368	Devonian	Abandoned
McColl Frontenac-Union 1-20	Lsd. 1-20-46-26 W. 4th	6,218	Devonian	Abandoned
McColl Frontenac-Union 14-14	Lsd. 14-14-48-27 W. 4th	6,231	Devonian	Abandoned
Millet Leduc 16-6	Lsd. 16-6-48-24 W. 4th	6,255	Devonian	Abandoned
Alberta Syncline				
Royalite De Winton 2	Lsd. 13-24-21-1 W. 5th	10,401	Devonian	Abandoned
Saskatchewan				
Rex 1-5-28	Lsd. 5-28-51-27 W. 3rd	1,775	Low Cretaceous	Abandoned
Bata 20	Lsd. 6-22-39-23 W. 3rd	2,126	Devonian	Gas and oil show
Canadian Petroleums 1	Lsd. 4-21-11-29 W. 3rd	1,452	Upper Cretaceous	Sparky sand Abandoned
Manitoba				
Coutts Portage la Prairie 1	S.W. ¼ of 59-12-7 W.P.M.	1,540	Low Cretaceous	Suspended
Langford Syndicate 1	Lsd. 5-29-14-14 W.P.M.	2,519	Pre-Cambrian	Abandoned

the various Provincial governments. The Alberta Department of Lands and Mines announced changes in July whereby important limitations were introduced into the previous regulations. It was expected that the final regulations would be announced early in 1948.

Early in the year the Province of Manitoba passed new regulations governing the disposal of oil and gas rights on Crown lands and the exploration, development and production of oil and gas in Manitoba. Close to 1,750,000 acres of Crown lands were reserved and leased under the new regulations during the year. All of these lands are situated in southwestern Manitoba and are scattered from the International Boundary north to Township 25, and from Range 5, West of the Principal Meridian to the Saskatchewan Boundary. Geological and geophysical studies were undertaken in the province by the Brandon Exploration Company.

EASTERN CANADA

The area included in Eastern Canada consists of the provinces of Ontario, Quebec, New Brunswick, and Nova Scotia.

ONTARIO

There were 405 wells of all types completed in Ontario during 1947 and, of these, approximately 89 wells were drilled in search of new oil or gas fields, or extensions to proved fields. At least 70 per cent of the exploration wells, and almost 90 per cent of the total wells drilled, were seeking gas and not oil production. A remarkable fact is the drilling of 148 development gas wells, most of which had initial potentials of less than 100,000 cubic feet. Only 8 wells are recorded that had initial gas flows in excess of 500,000 cubic feet.

The Imperial Oil Limited discovered a new gas field at Kimball, 11 miles south of Sarnia. The discovery well Imperial's Kimball No. 2, showed an initial open flow of 435,000 cubic feet daily from the Salina formation at the depth of 2,150–2,195 feet. Two dry holes and 3 gas wells were completed in the field during 1947. The discovery is important, having helped to alleviate the shortage of natural gas in southwestern Ontario during the winter months.

The Becher field, discovered in 1946, was extended with the drilling of 23 wells and, of these, 10 were dry holes, 9 oil wells, and 4 gas wells. The field produced 20,263 barrels of oil and 130,000,000 cubic feet of gas during 1947.

Imperial's Rhodes No. 2, located in Lot 13, Concession 7, Raleigh Township, Kent County, was completed in the Trenton formation at 3,351 feet as a dry hole. This was the deepest well drilled in the province during the year.

QUEBEC

During the year, exploratory drilling was carried out in Gaspé Peninsula.

Imperial's Gaspé No. 1, a test well on Bald Mountain anticline, was drilling at 1,830 feet at the end of the year.

Late in December, Ventures No. 2 was reported drilling at a depth of 2,040 feet in Devonian limestone.

C.P.L. No. 2 was drilled to 3,000 feet and abandoned. C.P.L. No. 1 was standing after drilling to 2,500 feet.

NEW BRUNSWICK

The Shell Oil Company of Canada operated a number of exploration parties in the province. No exploratory wells were drilled during the year.

NOVA SCOTIA

An important wildcat well, the Sun's Smith No. 1, was drilled 11,504 feet on the Minudie anticline 3 miles south of Amherst, Nova Scotia. The well started in salt and gypsum of the Windsor series, passed into brown and gray siltstones at 6,090 feet, and finally entered what is believed to be the Albert formation at 9,010 feet. Although some evidence of albertite was reported in the samples, the well was completed as a dry hole. The entire drilling was in Mississippian beds, ending in rocks similar to the basal part of the Albert series of New Brunswick.

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Well	*Lot*	*Location Conc.*	*Twp.*	*Depth in Feet*	*Age of Strata Reached*	*Results*
S. B. Greyson	114	6	Bayham	1,074	Silurian	Dry
John G. Barnes	9	2	Bertie		Silurian	
Arza Parker	11	4	Caistor	450	Silurian	Dry
Edgar K. Shirton 1	9	5	Caistor		Silurian	
A. J. Hughson 1	12	A	Camden	1,861	Silurian	
J. Gibson	2	5	Camden Gore	1,662	Silurian	Dry
H. Groenenburg	2	6	Camden Gore	1,688	Silurian	Dry
H. Groenenburg	3	6	Camden Gore	1,660	Silurian	Dry
Wm. G. Hughson	5	7	Camden Gore	1,640	Silurian	Dry
John Parking 1	8	13	Camden Gore	1,653	Silurian	Dry
J. & P. Kominek	3	5	Camden Gore	1,640	Silurian	Gas 1,434; oil 1,610–20
J. J. Bailey	28	5	Crowland	625	Silurian	Gas 33 MCF
J. A. Salts	6	5	Enniskillen	2,185	Silurian	Dry
J. A. & F. J. Cross 1	28	7	Euphemia	1,791	Silurian	Dry
M. Fansker	18	2	Euphemia	1,663	Silurian	
A. McArthur	29	1S of Durham Rd.	Glenely			
Mabel Williams	2	Front	Howard			
E. & J. Kenneday	21	9	Malhide	1,001	Silurian	Dry
A. Schram	1	4	Malhide	1,081	Silurian	Gas 26 MCF
G. A. Wood	34	4	Malden	945	Silurian	Gas 700 MCF
G. A. Wood	34	4	Malden	1,026	Silurian	Dry
F. P. Mellar	53	5	Malden	991	Silurian	Dry
Harry Wood	36	4	Malden	1,036	Silurian	Dry
John Gibb	3	Knapp Is.	Malden	997	Silurian	Dry
Henry Anderson	38	4	Malden	1,055	Silurian	Dry
C. Bush	6	5	Moore	2,257	Silurian	
Dow Chemical 1	30	R. Front	Sarnia	2,720	Silurian	
Jos. Hoover	21	6	S. Cayrega	830	Silurian	Dry
Elwood Nichol	12	9	Tecumseh		Silurian	
John & Mary Dzugan	7	5	Wainfleet	673	Silurian	Dry
C. R. & R. N. McCollum	5	5	Wainfleet	647	Silurian	Dry
Wilbur Ryerse 1	14	2	Woodhouse	1,069	Silurian	Dry
Williams Estate	26	4	Yarmouth	1,020	Silurian	Dry
Alex. M. Munroe	8	7	Yarmouth	1,670	Silurian	Dry
Barbara Duncass	14	8	Yarmouth	1,590	Silurian	Gas 335 MCF
Padecombe Estate	14	8	Yarmouth	1,590	Silurian	Gas 158 MCF
R. & M. Johnson	29	Eastern Division	Aldborough		Silurian	
A. & S. Brentz	15	13	Dawn			Completed Jan. 10—Dry
Charles Allen	12	8	Dereham			
Percy Siddall	2	Pt. Maitland	Dunn			
Grant Darley	2	2 cross	Moulton			
Manley Gibb	53	5	Malden			
R. & J. Goethalls	15	12	N. Walsingham			
A. & M. DeVos	13	13	N. Walsingham			
John Huber	14	6	S. Cayuga	858	Silurian	
John Huber	14	6	S. Cayuga			
R. Kriter	10	6	S. Cayuga	849	Silurian	Gas 100 MCF
Chas. Millen	12	6	S. Cayuga			
Harold L. Rice	244		Thorold			
S. J. Zimmer	241		Thorold			
Albert Hock	21	1	Wainfleet			
Frank Wight	9	2	Woodhouse			

WILDCAT WELLS COMPLETED IN 1947—(*continued*)

Well	*Lot*	*Location Conc.*	*Twp.*	*Depth in Feet*	*Age of Strata Reached*	*Results*
H. Doupe 1	17	6	Sarnia	523	Devonian	14 MCF gas
W. Kimber 1	17	6	Sarnia	623	Devonian	Gas 10 MCF @ 580 ft.
F. P. Miller 1	53	5	Malden	991	Silurian	Showing gas
G. A. Wood 2	34	4	Malden	945	Silurian	Gas 700 M
G. A. Wood 3	34	4	Malden	1,026	Silurian	Showing gas
H. Wood 1	36	4	Malden	?		Dry
B. Dodd 1	10	5	Metcalfe	405	Devonian	
G. Jacob 1	10	6	Hay	300	Devonian	Completed Nov. 7—dry
C. Bush 1	6	5	Moore	?	Devonian	Completed Nov. 1—(Bridgen well)
Mosald 1	20	A, BF, ED	Aldborough	1,650	Silurian	Gas 75 MCF; 1,650 ft., comp. Jan. 20
Essex Gas 10	Knapp Is.	3	Malden	997	Silurian	Comp. Oct. 29; small gas showing; plugged 997 ft. TD
Essex Gas 11	38	4	Malden	1,055	Silurian	1,055 ft. TD (dry); comp. Nov. 29
No. 50	7?	2S	Warwick	400	Devonian	Comp. Jan.—Dry 400 ft.; showing 380–390 ft.
Imp. Rhodes 2	10	6	Raleigh	3,351	Ordovician	Dry
Imp. Wilsoncroft 4	28	9	Enniskillen	480	Devonian	Dry
Imp. Atkin 1	1	1	Brooke	500	Devonian	Dry
Imp. Seckerton 2	22	7	Moore	615	Devonian	Dry
Imp. Wilsoncroft 2	26	8	Enniskillen	425	Devonian	Dry
Imp. Eddy's Mills 1	28	10	Dawn	520	Devonian	Dry
Imp. Atkin 2	4	2	Brooke	390	Devonian	Dry
Imp. Colinville 1	12	7	Moore	660	Devonian	Dry
Imp. Gustin Grove 1	70	L.R.W.	Bosanuet	580	Devonian	Dry
Imp. Cromar 1	1	2	Enniskillen	615	Devonian	Dry
Imp. Moravian 3	11	12	Oxford	575	Devonian	Dry
Imp. Cairo 1	24	4	Euphemia	455	Devonian	Dry
Imp. Strangefield 1	12	9	Tilbury West	1,277	Silurian	Dry
Imp. Coveny 1	13	10	Sombra	2,234	Silurian	Dry
Imp. Haycroft 1	8	2	Essex	1,420	Silurian	Dry
Imp. Strangefield 2	6	10	Tilbury West	1,213	Silurian	Dry
Imp. Duthill 1	20	9	Sombra	2,060	Silurian	Dry
Union-Imp. Wyoming 1	14	2	Plympton	2,589	Silurian	Dry
Imp. Gesto 1	15	1	Colchester	1,150	Silurian	Dry
Imp. Sutorville 1	10	13	Brooke	2,135	Silurian	Dry
Imp. Whitebread 1	A	5	Sombra	2,165	Silurian	Dry
Union-Imp. Wyoming 2	17	4	Plympton	2,536	Silurian	Dry
Imp. Sutorville 2	11	13	Brooke	2,153	Silurian	Dry

GENERAL

During the year the Alberta Society of Petroleum Geologists was engaged in compiling a symposium on the stratigraphy of Western Canada. This symposium is designed to establish a uniformity of nomenclature and to present the revised interpretations and new additions which have been made since the last symposium was compiled and published in the A.A.P.G. *Bulletin*, Vol. 15 (October, 1931).

A new schedule containing a list of all wells drilled in Alberta to the end of 1947 was being prepared by the Petroleum and Natural Gas Conservation Board, Calgary, Alberta, and it was expected that this would be released early in 1948. Also being prepared by the same agency was the Review of the Alberta Petroleum Industry for 1947. The schedule of wells gives geological markers and pertinent data on all wells drilled in field areas as well as the same data on all wildcat wells which are declared open one year after they have completed drilling.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
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HIGHLIGHTS ON 1947 DEVELOPMENTS IN FOREIGN PETROLEUM FIELDS[1]

L. G. WEEKS[2]
New York, N. Y.

SUMMARY

As shown in the last columns of Table I, the year 1947 brought a 9.6% increase in world oil production over 1946 and 43% over 1939. These result from an increase in the United States of 7% over 1946 and 47% over 1939, and from an increase abroad of 14% over 1946 and 43% over 1939. Along with post-war readjustments, there were large regional differences in production change, as is shown in Table I. The largest progressive increase in production over recent years was in the Middle East, amounting to 19% over 1946 and 163% over 1939. Indonesia recorded a 60% increase over 1946 but was still 63% below 1939. Europe and Asia, outside of Russia, produced somewhat less last year than in 1946 and considerably less than in 1939, due either or both to the ravages of war and post-war policies. Russia, recovering from the effects of war and urged by the pressure of demand for petroleum, increased production 17% over 1946, but was still 14% below pre-war. Outstanding in the Western Hemisphere is Venezuela, which registered an increase of 12% over 1946 and 112% over 1939.

In addition to the trend in individual areas, the first four columns of Table I show the relative percentage of world production supplied in 1930, 1939, 1946 and 1947. Column 1 of Table II shows the same picture for cumulative production through 1947. Of principal note is the rather consistently uniform percentage of total world oil produced since 1930 by the Western and Eastern Hemispheres (about 80 and 20% respectively), by the United States (62%), and by all foreign (38%). During the same 18-year period there was a moderate increase in South America (13.4 to 17.2%), which was offset by a moderate decrease (66.6 to 63.6%) in North America. A three-fold increase in the Middle East (3.5 to 10.5%) was approximately balanced by decreases in other regions of the Eastern Hemisphere.

The first two columns of Table II give a good comparison of percentage distribution of oil production in 1947 with cumulative for the major regional subdivisions. Outstanding in this comparison is the place taken to-day by Venezuela and the Middle East, in each case the percentage of total world output in 1947 was approximately double the percentage of total cumulative.

The third column of Table II gives the regional distribution of the world's nearly 70 billion barrels of proved reserves. The fourth column of Table II gives the writer's estimate of the approximate distribution of ultimate potential reserves, which includes oil produced to date, proved reserves and oil still to be found. These figures are the result of long and extensive analytical study of the basin areas of the world. They are calculated largely by the use of various factors, resulting in the first place from an analysis of the facts of oil occurrence worldwide, and secondly from an extensive study of the relation thereto of a great many fundamental facts of basin classification and architecture, deposition conditions, environment and history that are empirically found to control oil occurrence. Part to all of the figures given here, at various stages of revision, have appeared in print previously. The last column shows the percentage of ultimate produced, arrived at by dividing the figures in column 1 by the estimates in the fourth column. The significance of these figures is apparent.

A table at the end of the main paper gives cumulative oil production through 1947 and daily averages for 1939 and 1947 for all countries and major world subdivisions. Another table at the end of the main paper shows the distribution of geophysical effort in crew months for 1947. Comparison with 1946 indicates an approximate 20% increase in geophysical study which appears to be an approximate measure of the increase in total exploratory effort in 1947.

The main paper gives a brief outline of the highlights of developments during 1947 for more than 60 foreign countries in which there was activity in the search for oil.

INTRODUCTION

A year ago the writer reported to the Association at its annual meeting in Los Angeles on the post-war developments in foreign petroleum fields. As that was the first review of this nature for the Association, the account of recent develop-

[1] Presented by title before the Association at Denver, April 26–29, 1948. Manuscript received, March 18, 1948. Published through the courtesy of the Standard Oil Company (New Jersey).

[2] Chief research geologist, Standard Oil Company (New Jersey).

TABLE I. Daily Average Oil Production and Percentage Relations

Country or Region	1930		1939		1946		1947		% Increase, 1947 Over		
	Barrels	%	Barrels	%	Barrels	%	Barrels	%	1930	1939	1946
United	2,460,304	63.7	3,465,649	60.9	4,747,000	63.0	5,082,000	61.5	107	47	7
Balance N. America	112,571	2.9	137,867	2.4	155,450	2.1	175,700	2.1	56	27	13
Total N. America	2,572,875	66.6	3,603,516	63.3	4,902,450	65.1	5,257,700	63.6	104	46	7
Venezuela	374,436	9.7	562,829	9.9	1,064,900	14.1	1,190,800	14.4	208	112	12
Balance S. America	144,726	3.7	213,432	3.7	213,975	2.8	226,865	2.8	57	6	6
Total S. America	519,162	13.4	776,261	13.6	1,278,875	16.9	1,417,655	17.2	173	83	11
Total W. Hemisphere	3,092,037	80.0	4,379,767	76.9	6,181,325	82.0	6,675,365	80.8	116	52	8
Europe, excl. Russia	132,737	3.4	159,722	2.8	132,900	1.8	129,410	1.6	−2.5	−19	−2.6
Middle East, incl. Egypt	133,526	3.5	329,055	5.8	725,400	9.6	864,000	10.5	547	163	19
Balance Asia, excl. Russia	28,060	0.8	34,416	0.6	11,650	0.2	11,400	0.1	−48	−58	−2
Indonesia	127,940	3.3	179,937	3.2	35,000	0.5	56,000	0.7	−56	−63	60
Africa, excl. Egypt	44	—	—	—	—	—	—	—	—	—	—
Total E. Hem. excl. Russia	422,307	11.0	703,130	12.4	904,950	12.0	1,060,810	12.9	152	51	17
Russia	349,000	9.0	611,319	10.7	450,000	6.0	525,000	6.4	50	−14	17
Total E. Hemisphere	771,307	20.0	1,314,449	23.1	1,354,950	18.0	1,585,810	19.2	106	21	17
Total world	3,863,344	100.0	5,694,226	100.0	7,536,275	100.0	8,261,175	100.0	114	45	9.6
Total foreign	1,403,040	36.3	2,228,577	39.1	2,789,275	37.0	3,179,175	38.5	127	43	14

TABLE II. Production and Reserve Summary

Country or Region	Cumulative January 1, 1948		1947 Daily Average		Proved Reserves		Ultimate Potential Reserves		Percentage of Ultimate Produced
	Millions Bbls.	%	Barrels	%	Millions Bbls.	%	Millions Bbls.	%	
United States	35,080.7	64.1	5,082,000	61.5	21,488[1]	31.6	110,000	18.0	32
Balance N. America	2,435.7	4.4	175,000	2.1	1,200	1.7	40,000	6.6	6
Total N. America	37,516.4	68.5	5,257,700	63.6	22,688	33.3	150,000	24.6	25
Venezuela	4,046.6	7.4	1,190,800	14.4	9,650	14.2	80,000	13.1	7
Balance S. America	1,549.8	2.8	226,865	2.8					
Total S. America	5,596.4	10.2	1,417,665	17.2	9,650	14.2	80,000	13.1	7
Total W. Hemisphere	43,112.8	78.7	6,675,365	80.8	32,338	47.5	230,000	37.7	14.4
Europe, excl. Russia	1,655.0	3.0	129,410	1.6	650	1.0	13,000	2.1	12.7
Middle East, incl. Egypt	2,541.5	4.6	864,000	10.5	28,800	42.3	155,000	25.4	1.6
Balance Asia, excl. Russia	429.9	0.8	11,400	0.1	100	.15	24,000	4.0	1.8
Indonesia	1,241.8	2.3	56,000	0.7	1,100[2]	1.6	30,000	4.9	4
Africa, excl. Egypt	0.6	0.01	—	—	50	.07	8,000	1.3	.01
Total E. Hem. excl. Russia	5,868.8	10.7	1,060,810	12.9	30,700	45.1	230,000	37.7	2.5
Russia	5,783.9	10.6	525,000	6.4	5,000	7.4	150,000	24.6	3.8
Total E. Hemisphere	11,652.7	21.3	1,585,810	19.2	35,700	52.5	380.000	62.3	3
Total world	54,765.5	100.0	8,261,175	100.0	68,038	100.0	610,000	100.0	9
Total foreign	19,684.8	35.9	3,179,175	38.5	46,550	68.4	500,000	82.0	4

[1] A.P.I. [2] *Oil and Gas Journal.*

ments in most countries was prefaced by a brief statement of historic background interest. The present paper continues the report on foreign developments through 1947.

As it would be difficult to make a true abstract of a paper covering the varied developments in more than 60 countries, the writer prepared instead the summary with its two tables at the head of this paper. It constitutes an analysis of production and percentage relations over the past 18-year period as well as of present proved and potential reserves, by major world subdivisions. It was felt that such a summary analysis would be of more value, and that it would serve as an interesting supplement to the main paper.

The areas subject to our remarks may be followed on the accompanying set of maps on which are broadly sketched sedimentary areas and the main oil fields of interest. For simplicity the countries of Europe are shown with their pre-war boundaries. At the close of the paper is a table of cumulative production through 1947 and average daily yield for 1939 and 1947 for each country and major world subdivision. Another appended table gives the worldwide geophysical activity in 1947 in crew months.

It will be appreciated that there is a lack of information on some countries. Our remarks for such countries are general and are based on what was considered to be the most reliable information available to us.

In addition to his colleagues, the writer is indebted to the following individuals for supplying him with data ranging from items of interest up to the greater part of the data used for the country or countries mentioned after each name.

Norval E. Baker.....Iraq, Syria, Palestine, Transjordan, Lebanon, Cyprus, Qatar, Trucial Oman, Hadramaut
Frederic A. Bush.....Ethiopia
Arthur A. Curtice.....Alaska
James Terry Duce.....Saudi Arabia
Percy Evans.....India, Pakistan, Burma
F. Julius Fohs.....Russia
Brandon H. Grove.....Poland and Austria
Ben F. Hake.....Nicaragua, Denmark, Morocco and Kuwait
Earl B. Noble.....Paraguay
Avelino Ignacio Oliveira..
and J. Hamilton Garner..Brazil
Eduardo Simian.....Chile

WESTERN HEMISPHERE

ALASKA

Exploratory operations continued throughout the year 1947 in Naval Petroleum Reserve No. 4, which lies in the Arctic coastal plains basin north of the Brooks Range. Geological work consisted of 14 geologic party months by four parties. Two seismograph crews operated for a total of 11 crew months, and one gravity meter mounted on a pontoon plane for a total of 4½ months. Thirteen thousand square miles were covered by the gravity meter in this way at 5-mile

Total foreign	19,684.8	35.9	3,179,175	38.5	46,550	68.4	500,000	82.0	4

[1] A.P.I. [2] *Oil and Gas Journal.*

FIG. 1

spacing, the plane alighting on the waters of the myriad of lakes present in the Arctic plain to take readings.

Umiat No. 2 was completed at 6212 feet as a dry hole on the Umiat structure where well No. 1, also dry, was completed in 1946 at a depth of 6,005 feet. Oil sands encountered in these wells were tight and yielded only minor showings of oil.

Three core holes were drilled for stratigraphic information. Two of these, Sentinel Hill and Skull Cliff, were drilled to 1,180 and 779 feet, respectively. The third, drilled to 572 feet to test shallow sands on the Umiat structure obtained a potential production in the permafrost zone of 25–30 barrels per day on the pump. The Umiat structure is considered proved for small, shallow production in the crestal area. One deep exploration well, Cape Simpson No. 1, located on a seismograph structure in the vicinity of the largest seepages on the Reserve, was drilling at 6,093 feet at the end of 1947. The well logged Tertiary to approximately 2,700 feet, below which it has been drilling in the Cretaceous. Gas was encountered somewhere within the first 1,000 feet in the Tertiary and enough gas is flowing from between the casing strings to supply the camp.

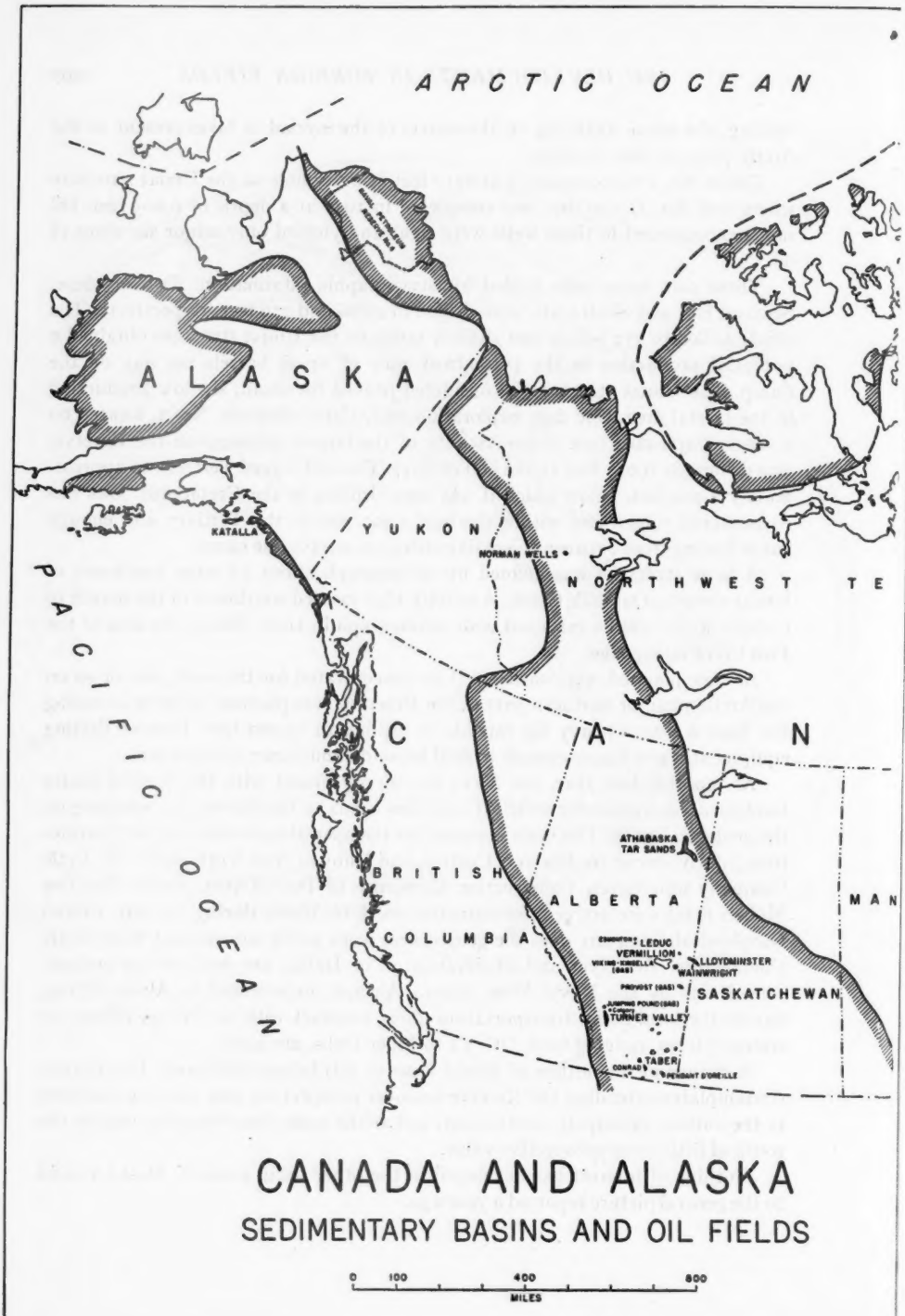
A large structure was defined by seismograph about 75 miles northwest of Umiat crossing Oumalik Creek. A gravity high located southwest of the mouth of Colville River will be surveyed with seismograph in 1948. This is the area of the Fish Creek oil seepage.

As now planned, exploration will be concentrated for the next year or so on the Arctic plain or northern part of the Reserve. It is planned to bring in during the 1948 season a heavy rig capable of drilling to 11,000 feet. Present drilling equipment is not heavy enough to drill beyond about 6,000 or 6,500 feet.

As reported last year, the Navy has an agreement with the United States Geological Survey under which it provides funds to the Survey for carrying on the geological work. The main contract for the operations is with Arctic Contractors, jointly owned by Hoover, Curtice, and Ruby of New York and C. F. Lytle Company and Green Construction Company of Des Moines, Iowa. The Des Moines firms were active in construction work in Alaska during the war. United Geophysical Company does the geophysical work under subcontract with Arctic Contractors. DeGolyer and MacNaughton of Dallas are retained as geologic consultants by the Navy. Wien Alaska Airlines, experienced in Alaska flying, handle the local aerial transportation under contract with the Navy. Fifteen or sixteen planes, ranging from DC–3's to Piper Cubs, are used.

A change in the outline of Naval Reserve 4 is being considered. This change contemplates extending the Reserve to cover prospective area not now included in the outline, principally on the east, and at the same time dropping area on the south of little or no prospective value.

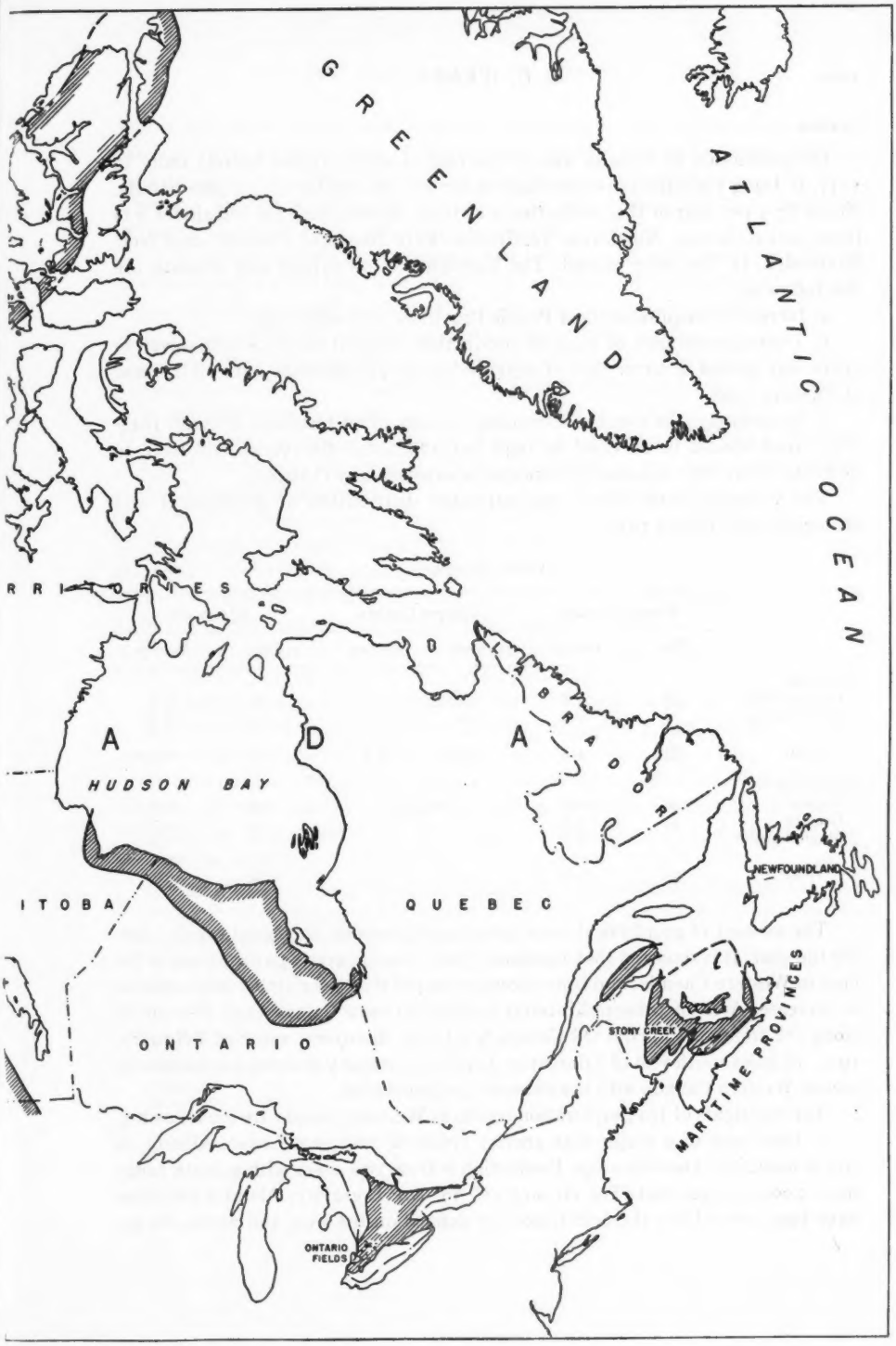
Nothing of interest has developed in the other basin areas of Alaska to add to the general picture reported a year ago.



CANADA AND ALASKA

SEDIMENTARY BASINS AND OIL FIELDS

FIG.


GREENLAND
ATLANTIC OCEAN
HUDSON BAY
NEWFOUNDLAND
QUEBEC
ONTARIO
STONY CREEK
MARITIME PROVINCES
ONTARIO FIELDS

CANADA

Oil production in Canada was at the rate of about 21,000 barrels daily in 1947, to bring the cumulative production for the country to 123,561,000 barrels. About 87.5 per cent of the production was from Alberta, and the remainder was from Saskatchewan, Northwest Territories (Fort Norman), Ontario, and New Brunswick, in the order named. The highlights of oil supply and demand are the following.

a. Increase in requirements of Prairie Provinces 10% over 1946.

b. During early part of 1947 oil production dropped to its lowest level in years, but gained in latter part of year to show an approximate over-all increase of 2% over 1946.

c. Accordingly, the trend of increasing imports of oil remained through 1947. This trend should be reversed in 1948 but additional discoveries will have to be made before the Canadian picture can be substantially changed.

The following table shows the estimated distribution of geophysical and geological work during 1947.

PARTY MONTHS

	Western Canada		*Eastern Canada*		*All Canada*	
	Total	*Average*	*Total*	*Average*	*Total*	*Average*
Geological						
Field geology	46	3.8	42(?)	3.5	88	7.3
Core drilling	7	0.6	12	1	19	1.6
Total	53	4.4	54(?)	4.5	107	8.9
Geophysical						
Seismic	149	12.4	negligible		149	12.4
Gravity	43	3.6	"		43	3.6
Magnetometer	7	0.6	"		7	0.6
Total	199	16.6	"		199	16.6

The amount of geophysical work, particularly seismic, increased rapidly during the year. It is reported that 19 seismic crews were operating at the close of the year in Western Canada, and it has been estimated that the number will continue to increase. Area of principal interest is that between Calgary and Edmonton along the trend of Imperial Oil Company's Leduc discovery, made in February, 1947, 18 miles southwest of Edmonton. Gulf Oil Company covered a considerable area in Western Canada with the airborne magnetometer.

The highlights of 1947 exploration results in Western Canada are the following.

a. Discovery of a major high-gravity crude-oil field near Leduc, Alberta, in reef dolomites of Devonian age. Production is from two zones with a depth range from 5,000 to 5,500 feet. The oil is of 38°–39° A.P.I. gravity. About 8,500 acres have been proved but the field is not yet defined on the west and north. At the

end of 1947 there were 35 producing wells. In January, 1948, Imperial's Woodbend No. 1, located 3½ miles north of Leduc field, came in with a yield of about 2,000 barrels daily. Woodbend may be part of a continuous field and not a new area. Probably upward of 100 million barrels of oil have been added to Canada's reserves in 1947 by the discovery in the Leduc area.

b. Extension of the Lloydminster Lower Cretaceous intermittently productive heavy-oil belt from a length of 26 miles to 40 miles. One hundred and seventy-seven wells were drilled in this belt in 1947 as compared with 58 completions in 1946. A plant was built to make asphalt and other oil products.

c. Discovery of a possible medium-gravity oil field at Bantry in a basal Lower Cretaceous sand of southeastern Alberta. A test was carried into the Devonian with uncertain results as yet.

d. Discovery of small gas field at Manyberries and extension of the Pakowki gas field in southeastern Alberta. Gas is reservoired in the Bow Island sand of early Upper Cretaceous age.

e. In the Jumpingpound area of the foothills, 22 miles west of Calgary, Shell Oil Company completed a fourth well to confirm the presence of a large gas-distillate field in the Mississippian limestone at a depth of about 10,000 feet.

f. Acceleration of leasing activity in Alberta due to the major discovery at Leduc and the urgency of finding new production. During the year most of the major oil companies not previously represented in Western Canada either began work there or scouted the country in anticipation of early active exploration.

Highlights of exploration results in Eastern Canada are the following.

a. Discovery by Imperial of the Kimball gas field in Moore County, 10 miles south of Sarnia, Ontario, at 2,000 feet in the Salina formation.

b. New oil discovery by Imperial early in January, 1948, near Tilbury, southwestern Ontario, from the Guelph formation at 1,168 feet. Though the well tested 6 barrels per hour of 38° A.P.I. oil, a large yield for Ontario, the field is not expected to be large.

c. Completion of Sun Oil Company's Smith No. 2, an important wildcat near Amherst, Nova Scotia, as a dry hole at 11,504 feet on the Minudie anticline, one of the largest anticlines in the Maritimes.

Wells drilled during 1947 in Canada are divided approximately as follows.

	Exploitation	*Exploration*	*Total*
Western Canada			
Alberta	186	26	212
Saskatchewan	91	14	105
Manitoba		1	1
Northwest Territories		2	2
Total	277	43	320
Eastern Canada (estimated)			
Mostly Ontario	250	60	310
All Canada	527	103	630

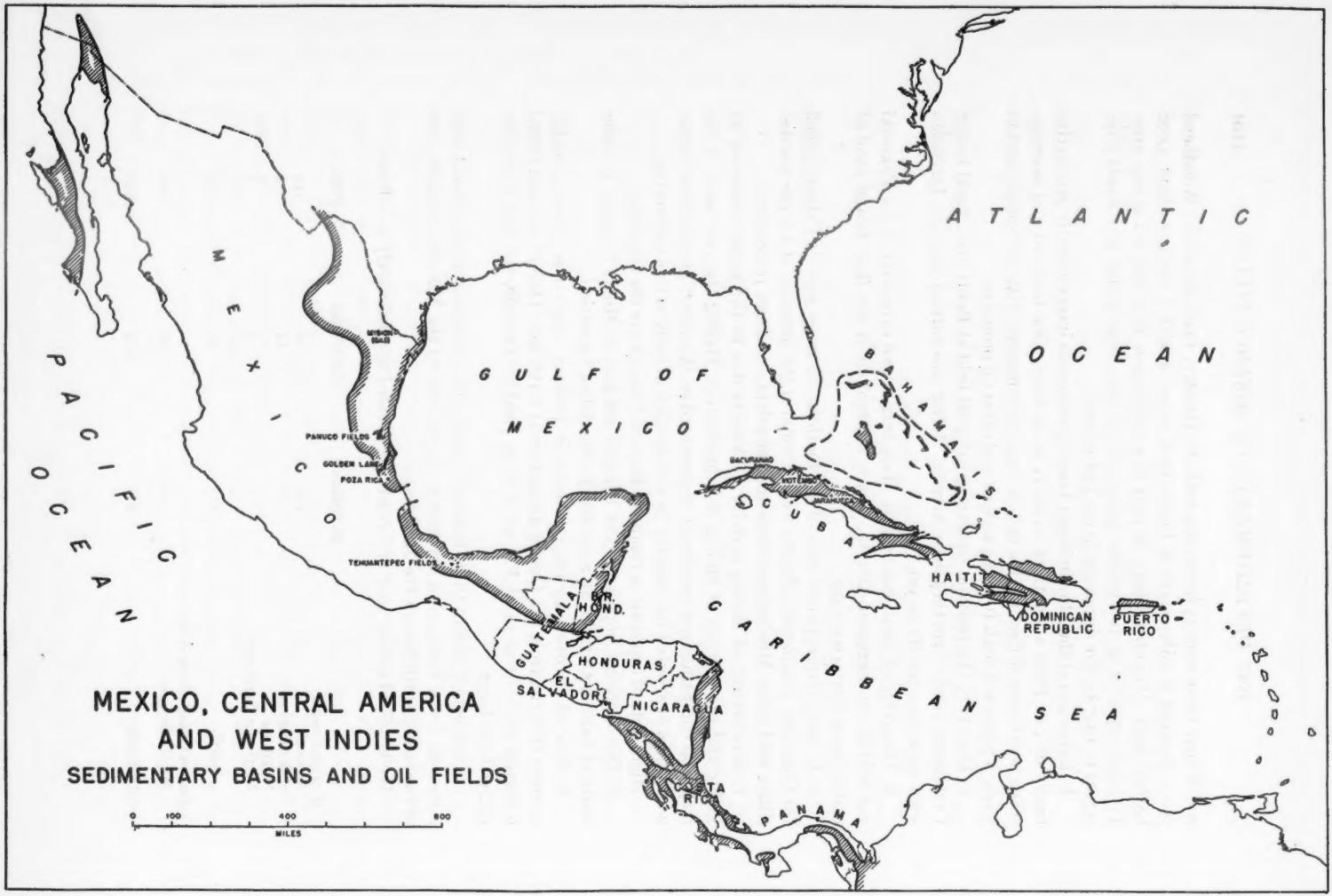

MEXICO, CENTRAL AMERICA
AND WEST INDIES
SEDIMENTARY BASINS AND OIL FIELDS
0 100 400 800
MILES
PACIFIC OCEAN
MEXICO
GULF OF MEXICO
ATLANTIC OCEAN
BAHAMA IS.
CUBA
HAITI
DOMINICAN REPUBLIC
PUERTO RICO
CARIBBEAN SEA
GUATEMALA
BR. HOND.
HONDURAS
EL SALVADOR
NICARAGUA
COSTA RICA
PANAMA
PANUCO FIELDS
GOLDEN LANE
POZA RICA
TEHUANTEPEC FIELDS

FIG. 3

The number of exploration wells drilling at the close of 1947 were: Alberta, 16; Saskatchewan, 2; and 20–25 in Eastern Canada, most of them in Ontario.

MEXICO

Cumulative oil production in Mexico totals about 2,311,000,000 barrels. Production for 1947, estimated from 10 months of production in the Isthmus area and 11 months of production in the other districts, totaled about 56 million barrels, divided approximately as follows.

	Total	*Bbls. Daily*
Northern district	10,000,000	27,400
Southern district	7,800,000	21,400
Poza Rica district	31,800,000	87,100
Isthmus area	6,400,000	17,500
Total	56,000,000	153,400

The production for 1947 represents a 13% increase over 1946, largely resulting from increases in the Poza Rica and Northern districts. There was a minor decrease in the output of the Southern district and little change for the Isthmus of Tehuantepec area.

The following table shows the extent of geologic and geophysical activity in 1947.

	Geologic	*Seismic*	*Gravity*	*Electric*
Crew or party months	127	106	39	12
Average number	10.6	8.8	3.25	1.0

Fifty wells were completed in Mexico in 1947. Of these 31 are classed as exploitation and 19 as exploration operations. The 31 exploitation wells were distributed as follows.

Areas	*Productive*	*Dry*	*Total*
Tampico North	3	2	5
Poza Rica	10	0	10
El Plan (Isthmus)	11	3	14
Cuichapa	2	0	2
Total	26	5	31

The 19 exploratory wells were about equally divided between wildcats and exploration close to old fields. Seven of these wells were located in northeast Mexico, four in the Tampico embayment, seven on the Isthmus and one in Chihuahua. Geology and geophysics are given about equal credit as a basis for locating the wells. So far as is known, no significant or important developments resulted from any of the exploratory tests.

As of the close of the year there were 13 exploratory or semi-exploratory tests drilling: 4 in northeast Mexico; 1 in the Northern district; 3 in the Southern district, and 5 in the Isthmus area. On February 15, 1948, two of the wells in northeastern Mexico and one in the Southern district had been completed as failures.

So far as known, there has been no marked extension of proved areas. All

drilling in the Poza Rica field now seems to be within the limits of the known producing area, which indicates that the field is definitely outlined.

The following table gives an interesting break-down of wells completed in Mexico by areas from the beginning through 1947 and by the Government's Pemex (Petroleos Mexicanos) since March 18, 1938, the date of expropriation.

Wells Completed in Mexico

Area	Since Beginning			By Pemex		
	Prod.	*Dry*	*Total*	*Prod.*	*Dry*	*Total*
Lower California	—	3	3	—	—	—
Chihuahua	—	5	5	—	1	1
Coahuila	—	22	22	—	—	—
Nuevo Leon	1*	25	26	—	2	2
Northern Tamaulipas	25*	30	55	6	4	10
Central Tamaulipas	—	12	12	—	—	—
Northern Fields						
Southern Tamaulipas	17	158	175	—	—	—
Tampico-Panuco area	1,616	2,624	4,240	19	61	80
Sub-total	1,633	2,782	4,415	19	61	80
Southern District						
Ozulama-Tantoyuca area	3	49	52	—	—	—
Tempoal area	—	24	24	—	—	—
East flank	38	104	142	—	2	2
Western group	2	24	26	1	7	8
Tlacolula-Metlaltoyuca	2	18	20	1	2	3
Main belt (Golden Lane)	527	531	1,058	—	5	5
Sub-total	572	750	1,322	2	16	18
Poza Rica Area						
Poza Rica-San Miguel Mec.	83	14	97	59	7	66
Furbero-Papantla	16	62	78	—	—	—
Veracruz Embayment	—	3	3	—	—	—
Isthmus of Tehuantepec						
Salina Basin	402	301	703	72	35	107
Tabasco	8	32	40	—	9	9
Chiapas	5	19	24	—	—	—
Sub-total	415	352	767	72	44	116
Oaxaca	—	6	6	—	—	—
Yucatan	—	6	6	—	—	—
Valley of Mexico	—	8	8	—	—	—
Totals	2,745	4,080	6,825	158	134	292

* Gas production only.

There has been no leasing activity during the year 1947. The petroleum industry in Mexico at the present time is a Government monopoly and there is no field for leasing activities other than trading in confirmatory concessions which were issued under the 1926 Petroleum Law and which were not included within the properties expropriated by the Mexican Government in March, 1938.

A number of United States oil companies and oil operators approached Petroleos Mexicanos during the year 1947 in an effort to arrive at some method of participating in exploration and exploitation of Mexico's undeveloped oil resources, but the only deal concluded during the year was a contract with J. Edward Jones to drill, it is reported, 100 test wells on a cost-plus and profit-percentage basis, but no actual operation has yet come out of the Jones contract.

A calculation of Mexican petroleum reserves made during the first half of 1947 and submitted in a report of a technical commission entitled, "Comision Pericial Tecnica Industrial Comercial," resulted in the following estimates.

	Barrels
Poza Rica	932,000,000
Tampico region	90,000,000
Southern zone	36,000,000
Total	1,058,000,000

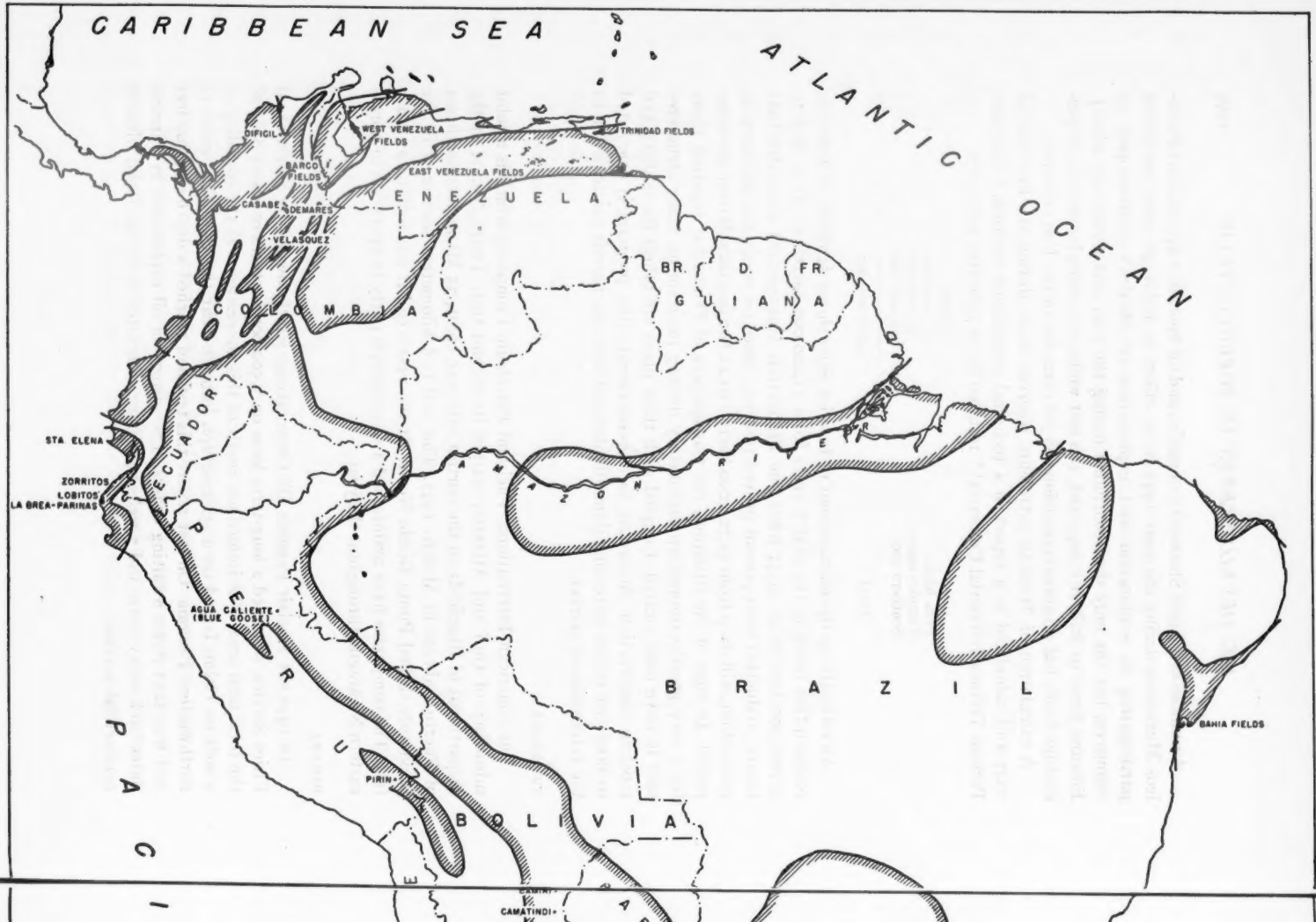
An estimate by the management of Interior Sales shows demands of domestic consumption rising in the next 8 years from 52,000,000 barrels of oil in 1948 to 70,200,000 barrels in 1955; while the Production Management estimates that future production from present proved reserves, based on maximum efficiency in production, will drop from 53,700,000 barrels to 42,800,000 barrels over the same period. In view of the situation, the management of Pemex has reported plans for a very greatly stepped-up exploratory drilling program on many structures said to have been located. Coupled with these plans are others for refinery and pipeline construction. According to announcements, the program is calculated to take care of the increasing domestic demand and also permit participation in the international market.

NICARAGUA

The American International Fuel and Petroleum Company, which is a joint subsidiary of Gulf and Atlantic, started its second test, Twara No. 1, in the Department of Bluefields on the north Caribbean coast, 35 kilometers northeast of Puerto Cabezas in March, 1947. The well is 8 kilometers southwest of the previously drilled Punta Gordo No. 1. At the year's end it was drilling at 5,085 feet. The companies have maintained a seismograph party in operation in northeastern Nicaragua throughout the year.

PANAMA

In 1946 the Sinclair Panama Oil Corporation, jointly owned by Sinclair and Cities Service, obtained a long-term lease on 7,500,000 hectares or about 85% of the total land area. The immediate result of this concession was the spudding of a well on Colon Island on a seismograph location near the Caribbean coast of northwestern Panama. On last report this test had reached a depth of 7,500 feet and was shut down awaiting orders. The history of oil exploration in Panama dates back many years and 7 wells have been completed and abandoned without commercial success.


CARIBBEAN SEA
ATLANTIC OCEAN
DIFICIL
WEST VENEZUELA FIELDS
TRINIDAD FIELDS
BARCO FIELDS
EAST VENEZUELA FIELDS
CASABE
DEMARES
VENEZUELA
VELASQUEZ
BR. D. FR. GUIANA
COLOMBIA
ECUADOR
STA ELENA
ZORRITOS
LOBITOS
LA BREA-PARINAS
AMAZON RIVER
AGUA CALIENTE (BLUE GOOSE)
PERU
BRAZIL
BAHIA FIELDS
PACIFIC
PIRIN
BOLIVIA
CAMATINDI

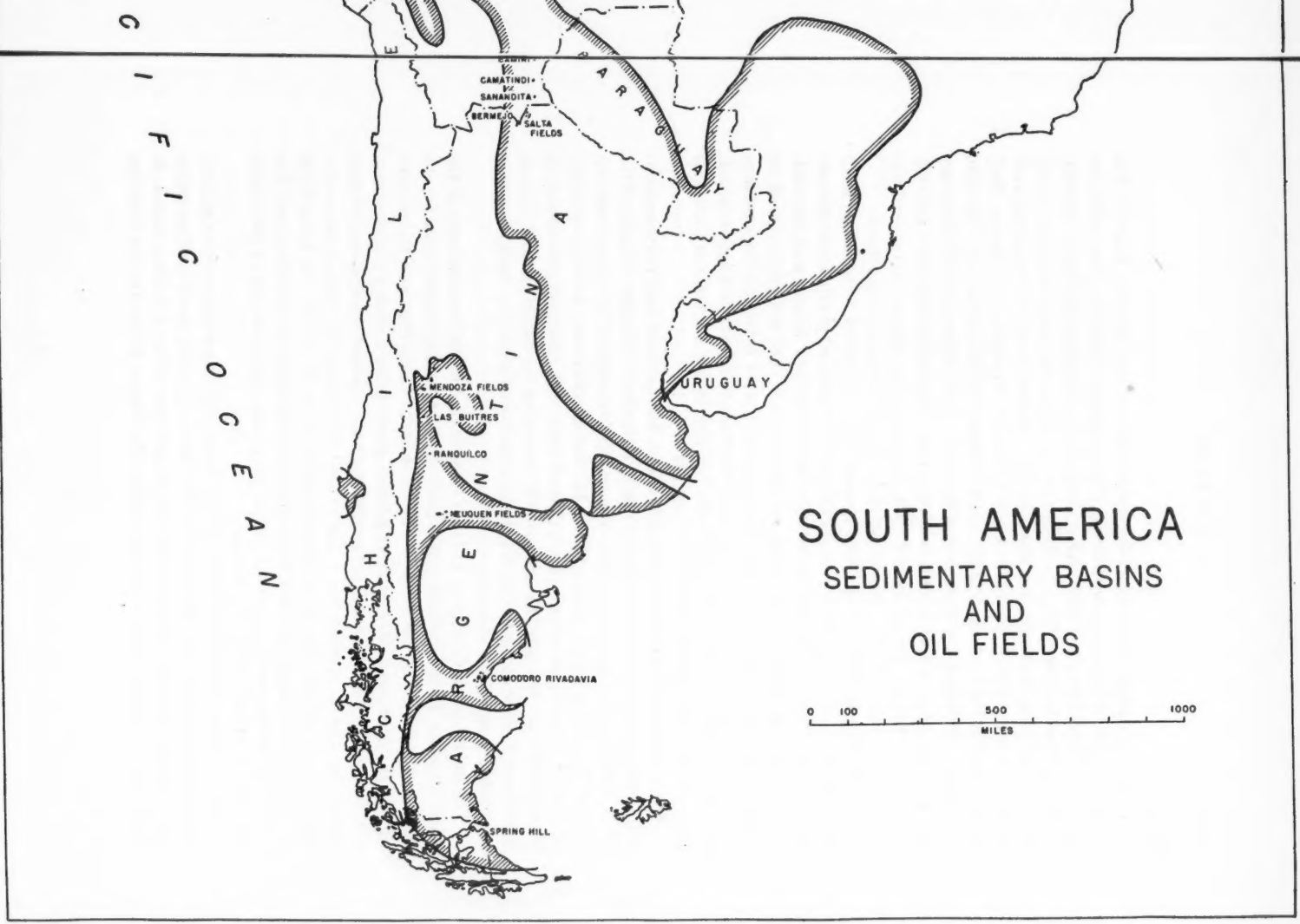

PACIFIC OCEAN
CHILE
ARGENTINA
PARAGUAY
URUGUAY
CAMATINDI
SANANDITA
BERMEJO
SALTA FIELDS
MENDOZA FIELDS
LAS BUITRES
RANQUILCO
NEUQUEN FIELDS
COMODORO RIVADAVIA
SPRING HILL
SOUTH AMERICA
SEDIMENTARY BASINS
AND
OIL FIELDS
0 100 500 1000
MILES

FIG. 4

BAHAMAS

Eight companies hold exploration concessions in the Bahama Islands. The lands held now total 48,426 square miles and comprise both the land areas, except New Providence, and the shallow water out to the 10-fathom depth contour.

During the months of May to November, a joint aerial magnetometer survey covering 84,358 square miles was flown by Aero Service Company for the account of the following five companies: Anglo-Bahamian Petroleum Company, Ltd. (Anglo-Iranian Oil Company, Ltd.); Shell Company of Bahamas, Ltd. (Shell Oil Company); Standard Oil Company (Bahamas) Ltd. (Standard Oil Company (N. J.)); Bahamas Exploration Company, Ltd. (Gulf Oil Company); and Bahamas Oil Company, Ltd. (Superior Oil Company). The magnetometer used was one developed by Gulf. The Shoran method was used for horizontal control.

The British Bahamian Oil Development, Ltd. (Trinidad Leaseholds, Ltd.) has been most active in the northeastern part of the island group where its concessions "M" and "L" cover Great Abaco and Eleuthera Islands and the shallows on the west. Land gravity work was done here in 1946 and gravity work on tripods in the water area continued through July, 1947. Control was by astrolabe stations on land. On the extreme south of the Bahamas, west of Ragged Island, the company began gravity mapping with a diving bell in August, 1947, and this work was still in progress at the end of the year.

The Standard Oil Company (Bahamas) Ltd. has confined most of its exploration to the northwest part of the island chain. Here Grand Bahama Island and the Little Bahama Banks at the north comprising Concession "N" have been examined by gravity meter, using a diving bell in the water area, and by land magnetometer. Also experimental work has been done with reflection and refraction seismograph. At the south, Concession "K" covering the shoals between Exuma Sound and Tongue of the Ocean, was being covered by a gravity diving bell during the last 5 months of the year.

The Bahamas Oil Company, Ltd. has Concession "B" on the north part of the Great Bahama Banks including the north half of Andros Island and on the eastern half of the Cay Sal Bank just north of Santa Clara Province, Cuba. During March, April, and May a water gravity party using a diving chamber was active in the Cay Sal region. This company also completed the only exploration well in the islands. Andros No. 1 was located near Stafford Creek in the north-central part of Andros Island at approximately 24° 53′ N. 78° W. The total depth of this well was 14,585 feet where drilling was suspended due to fishing job. The hole ended in Lower Cretaceous. The samples have been released to the public through the Florida Geological Survey.

South of the area just mentioned, the Anglo-Bahamian Petroleum Co., Ltd. operated throughout most of the year with its own gravity party on Concession "D," using a tripod in shallow water south and southwest of Andros Island. In April, gravity observations were initiated in the deeper waters farther from the

coast where a diving bell was used, and this work was continued till the end of December. Concession "H" on the east was also studied by a land gravity party working on Long Island. Experimental reflection and refraction work was conducted on Andros Island from the first of the year until June 15.

Other companies in the Bahamas, such as the Shell Company of Bahamas, Ltd. and Bahamas Exploration Co., Ltd. (Gulf), have been inactive during the year except for participation in the aerial magnetic survey. The Nassau Oil Mining Co., Ltd. (Christie Syndicate) and Bahamas Mining Co., Ltd. (Sigrist Syndicate) hold concessions but have been inactive. Present indications are that all activities will be greatly reduced during 1948.

CUBA

Cuba has two producing oil fields at present which gave a total average production for the year of approximately 700 barrels a day. The Jarahueca field production was built up to 1,000 barrels daily of 45° A.P.I. oil from 75 wells in September and October. The older Motembo field is producing 200 barrels a day or less of 60° A.P.I. oil. In both cases the production is from serpentine. Cumulative production in Cuba totals 580,000 barrels.

Early in the year, the Standard Oil Company of Cuba withdrew from active exploration on the island. It had carried out 2 months of surface geological and magnetic work in Northern Matanzas Province, and had drilled two shallow wells. The T-1 test, 2½ kilometers northwest of Maximo Gomez, was plugged on February 9 at a depth of 1,389 feet in serpentine. On the west, in Pinar del Rio Province, Banos No. 2, drilled jointly with Atlantic, was abandoned February 7, at 4,080 feet in lower Oligocene.

On the northeast coast of Cuba there was some activity by the Shell-operated Cia. Petrolera La Estrella. Two wells were drilled on Cayo Coco, one to below 10,000 feet and another to approximately 4,300 feet. Experimental seismograph work was undertaken late in the year.

The Gulf interests have recently entered the exploration field in Cuba as the Cia. Petrolera Eureka S. A. with concessions along the north coast of Matanzas, Santa Clara, and Camaguey. Some water gravity work has been done in this area and the aerial magnetometer has been used.

HAITI

Two wells were drilled by the Atlantic Refining Company. The Cul de Sac test east of Port au Prince reached a depth of 8,064 feet in Lower Oligocene on April 9. The second well, St. Marc No. 1, was drilled near Baie de St. Marc, 70 kilometers northwest of Port au Prince. This hole was taken to a depth of 4,099 feet in middle Oligocene where it was abandoned. The company then surrendered its concessions and withdrew from the country after 8 years of exploration work and the completion of four wildcat wells as dry holes.

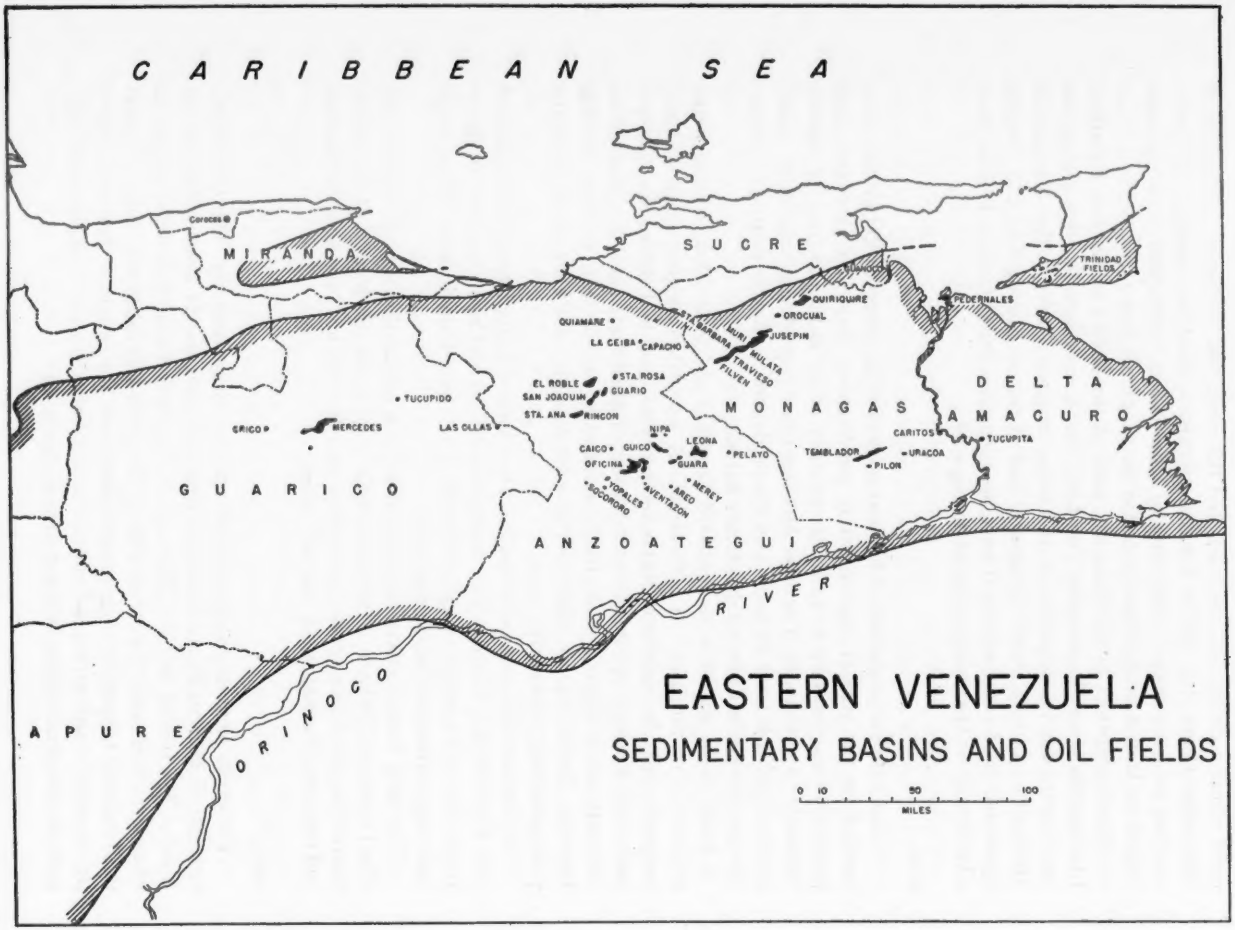

CARIBBEAN SEA
MIRANDA
SUCRE
TRINIDAD FIELDS
Caracas
QUIRIQUIRE
OROCUAL
PEDERNALES
QUIAMARE
LA CEIBA
CAPACHO
SANTA BARBARA
JUSEPIN
MULATA
TRAVIESO
FILVEN
EL ROBLE
STA. ROSA
SAN JOAQUIN
GUARIO
STA. ANA
RINCON
TUCUPIDO
ERICO
MERCEDES
LAS OLLAS
MONAGAS
DELTA AMACURO
CARITOS
TUCUPITA
NIPA
LEONA
CAICO
GUICO
OFICINA
GUARA
PELAYO
TEMBLADOR
URACOA
PILON
MEREY
AREO
AVENTADO
STOPALES
SOCORORO
GUARICO
ANZOATEGUI
RIVER
APURE
ORINOCO
EASTERN VENEZUELA
SEDIMENTARY BASINS AND OIL FIELDS
0 10 50 100
MILES

FIG. 5

DOMINICAN REPUBLIC

The only activity for the year was the drilling of Dominican Seaboard's Maleno No. 7 near the town of Azua in the Azua basin. This was a critical well and showed a complete check of subsurface structure with the predictions of the reflection seismograph. However, the middle Oligocene reef-limestone objective flowed 50,000 barrels a day of salt water at a depth of 5,682 feet where the hole was abandoned.

During the last half of the year, the company renounced all its concessions and terminated its exploration activity after 7 years of exploration and the drilling of nine test wells. Sixteen wells had been drilled in earlier years, all of them in the Azua area. A few thousand barrels of oil have been produced from the Maleno structure in this area.

TRINIDAD

Trinidad produced about 55,700 barrels daily in 1947 from the small basin in the southern part of the island, bringing the cumulative total to 348,798,000 barrels at the close of the year. This was a very slight increase over 1946.

An average of about 23 rigs operated largely on proved areas and extensions. The principal development of the year was the doubling of the proved area of the Penal field mainly by a large extension on the west and southwest, and also by joining with the Wilson field on the northeast. North of the Guaguayare fields in the southeastern part of the island, exploration of a geophysical structure has given some encouragement of developing moderate yields over a fairly broad area.

Fig. 5

Wildcatting was limited to one to three rigs. One well in the Brighton area was reported to have stopped in the Cretaceous at 6,500 feet at the end of the year. The deepest well in Trinidad was completed at 11,042 feet in the Cruse field by the United British Oilfields of Trinidad without finding deeper production. North and northeast of the producing fields area, geological and geophysical work has started on new exploratory concessions held by Trinidad Leaseholds, the Anglo-Iranian Oil Company, and United British Oilfields of Trinidad.

As reported last year, there is continued interest in the area submerged beneath the Gulf of Paria between Trinidad and the mainland of eastern Venezuela. However, no geophysical work has been started. Operations in the water area are being held up awaiting Government decision on the conditions for granting licenses to the various applicants.

VENEZUELA

Cumulative production in Venezuela now runs slightly more than 4 billion barrels. Production of about 1,190,800 barrels daily in 1947 represented an approximate 11% increase over 1946. The production trend since the war has been rather steadily upward. With the intensive exploration activities and increased demand, this trend will probably continue, for the immediate future at least.

The most prolific producing region continued to be the Bolivar Coastal field which lies along the eastern shore of Lake Maracaibo in western Venezuela. This area contributed approximately 248,400,000 barrels, or 57%, to the country's total, while all of western Venezeula accounted for 70%, or 305,900,000 barrels, an increase of 15% over 1946. Eastern Venezuelan production amounted to approximately 128,600,000 barrels, or 30% of the industry total, and 6% above the 1946 figure. Industry production at the close of the year 1947 was averaging about 1,250,000 barrels per day compared with 1,140,000 barrels per day at the beginning of the year. Estimated potential production for the country at the year's end was approximately 1,298,000 barrels per day.

The following table summarizes geologic and geophysical activity for the industry during 1947.

GEOLOGICAL AND GEOPHYSICAL ACTIVITY, 1947

	Geologic	*Core Drill*	*Seismic*	*Gravity*	*Magnetic*
Total party or crew months	204.5	53.0	321.25	159.25	9.0
Average number	17.1	4.4	26.8	13.3	0.75

Gulf and Creole participated in an airborne magnetometer survey of a large area of northern Venezuela between Paraguana and Goajira peninsulas. Gulf also covered considerable areas with this instrument in the south part of Lake Maracaibo and in the Apure basin of southwestern Venezuela.

Drilling operations during 1947 were on a larger scale than in any previous year in the history of the industry. A total of 787 wells were completed compared with 655 in 1946. The number and results of exploration and exploitation wells are shown as follows.

EXPLORATION AND EXPLOITATION WELLS, 1947

	Exploration		*Exploitation*	*Total*	
Oil	81	52.3%	613	694	88.2%
Gas	7	4.5	4	11	1.6
Dry	67	43.2	15	82	10.2
Total	155	100.0%	632	787	100.0%

At the year's end there were 135 drilling rigs operating in Venezuela, 64 of which were on field wells, 31 on outposts, 6 on deeper pool tests and 34 on wildcats. In addition, there were 21 rigs engaged in workover operations.

Ten new-field discoveries were completed in 1947. Seven of these are in eastern Venezuela, as follows.

Meneg OM-6, north of Oficina, for 440 b/d of 29.2° A.P.I. oil in the Miocene Oficina formation.
Meneg EGS-79, mid-way between east Guara and Leona fields, in two sands of the Miocene Oficina formation, for initials of 222 b/d of 19.1° A.P.I. and 305 b/d of 30.1° A.P.I. oil, respectively.
Meneg FZ-1 (Fria-1), north of Yopales field, for 463 b/d of 38.2° A.P.I. oil in an Oficina sand.
Atlantic Pelayo-1, east of Leona field, for 400 b/d of 30.0° A.P.I. oil in an Oficina sand.
Atlantic Pelas-1, north of Pelayo-1, for 100 b/d of 42.5° A.P.I. oil in the Oligocene.

Accumulation in all of these six wells of south-central Anzoategui is in the same strand belt of many sands and is controlled by the same strand and fault-line conditions that control production in the Oficina, Guara, and Leona fields.

The seventh discovery in eastern Venezuela was that of Atlantic's Saban-2-1 east of the Mercedes field and southeast of Valle de Pascua in the state of Guarico, which was completed for 720 b/d of 39.0° A.P.I. oil in a sand of probable Oligocene age.

The three remaining discoveries were made in western Venezuela, as follows.

Shell VL-1, in Lake Maracaibo west of the Lagunillas LL-370 area, for 1,500 b/d of 36.8° A.P.I. oil in Eocene sand. The well was drilled as a Cretaceous test, but the Cretaceous was found unproductive.

Richmond Zulia 26-1, about 120 kilometers southwest of Maracaibo on the west side of Lake Maracaibo, for 1,500 b/d of 32.0° A.P.I. oil in the Cretaceous La Luna-Cogollo limestones.

Shell WT-2 in southwest Zulia, 10 kilometers east of the Tibu field of the Barco Concession in Colombia and 9 kilometers southwest of the Tarra field in Venezuela, tested for 1,600 b/d of 42.0° A.P.I. oil in the Cretaceous Cogollo formation. A test in another section of the Cretaceous gaged 2,116 b/d of 46.0° A.P.I. oil.

In addition to the foregoing ten new-field discoveries, outpost completions added reserves in nine previously discovered fields or field areas. In eastern Venezuela these areas are as follows.

Several Creole outpost wells in the southeastern section of the Jusepin field and central and northern part of the Mulata field, all in northwestern Monagas State on the greater Jusepin trend.

Creole QQ-369, in the Quiriquire field of northern Monagas, for 357 b/d of 20.2° A.P.I. oil in the Oligocene, or below the main Quiriquire reservoir.

Creole RPN-12, on the north flank of Roble structure in north-central Anzoategui, for 1,370 b/d of 48.0° A.P.I. oil, opening a new zone in this section of the field.

Meneg AM-5, west of Sta. Ana field in west-central Anzoategui, for 322 b/d of 33.8° A.P.I. oil in the Merecure formation of Oligocene age.

In western Venezuela three successful outpost completions served to outline further the prolific Cretaceous limestone reservoir west of Maracaibo and the Lake.

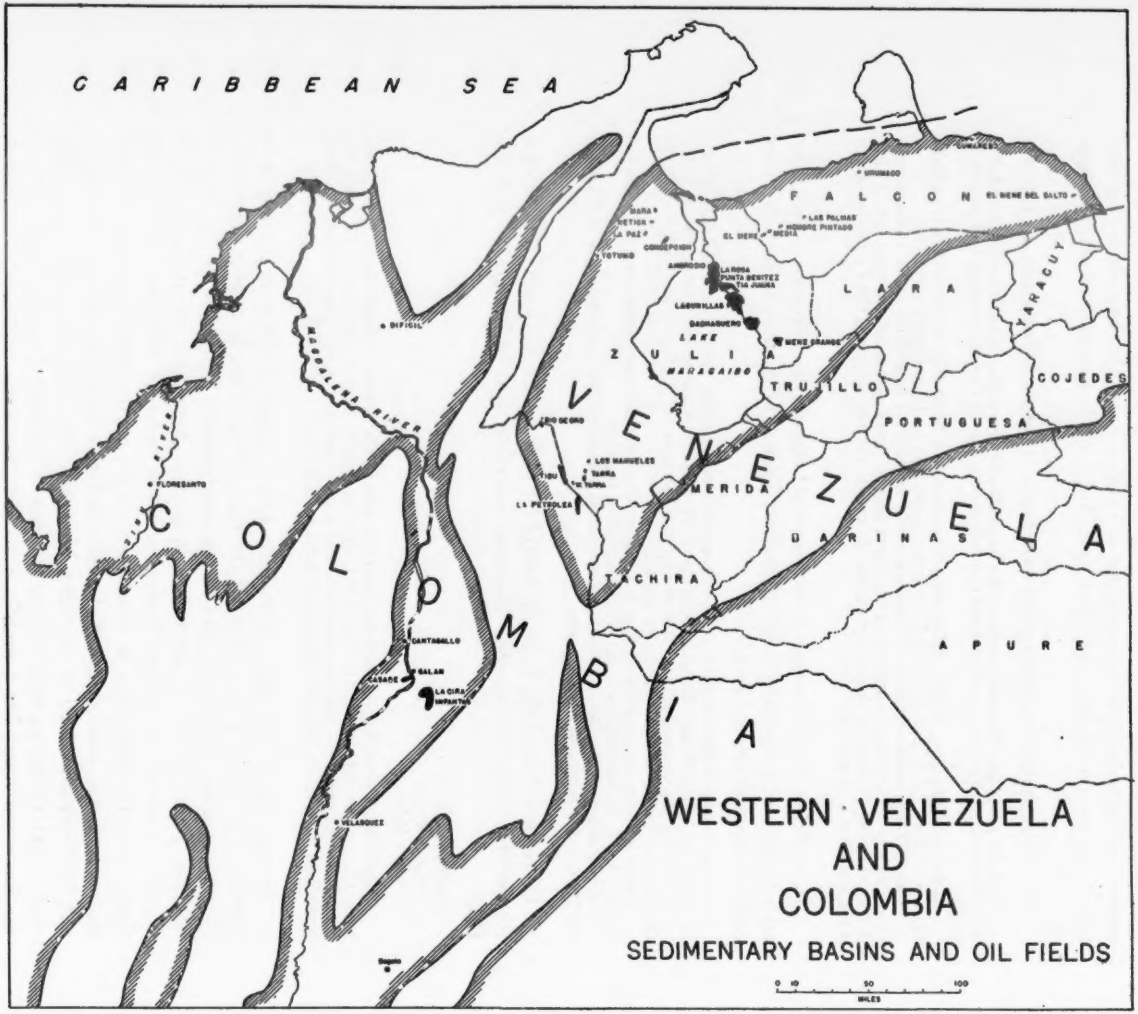
Shell's DM-7
Texas' Raban-1
Creole's MA-1.

Three other Creole outpost wells for the Lake area of the Bolivar Coastal fields are: LL-603 in the LL-370 area, for 1,386 b/d of 25.9° A.P.I. oil in the Eocene; LL-580, southeast of Tia Juana-102 area, for an extension of Eocene production, and a new discovery in the Oligo-Miocene La Rosa formation; B-35, in the Miocene Bachaquero sand, for 250 b/d of 11.7° A.P.I. oil.

At the close of the year, 33 wildcats and 8 outpost wells were drilling or in process of completing or testing. Of these 41 wells, 25 are in eastern Venezuela, 15 are in western Venezuela, and 1 is in southwestern Venezuela in the State of Barinas. Eight of the 25 operations in eastern Venezuela are in the State of Guarico; 4 are on the greater Jusepin trend of northern Monagas; 4 are on the Santa Rosa-El Roble area of Anzoategui; 5 are on the greater Oficina trend of Anzoategui; 1 is located near Pedernales in Delta Amacuro; another lies northeast of Temblador well in southern Monagas; and 2 are in northwesternmost Anzoategui. Of the 15 wells drilling in western Venezuela, 13 are located west of the Lake, and there are 1 each in Falcon, in the Lake, and in Colon district, southwest of the Lake.

Highlights in the developments for 1947 include the following.

1. Of first importance is the continued discovery and outlining of prolific pro-


CARIBBEAN SEA
FALCON
LARA
YARACUY
ZULIA
LAKE MARACAIBO
TRUJILLO
COJEDES
PORTUGUESA
MERIDA
BARINAS
TACHIRA
APURE
VENEZUELA
COLOMBIA
MAGDALENA RIVER
CATATUMBO RIVER
CASABE
WESTERN VENEZUELA AND COLOMBIA
SEDIMENTARY BASINS AND OIL FIELDS
0 10 50 100
MILES

duction and new reserves in the Cretaceous limestone reservoirs west and southwest of kake Maracaibo. Outstanding in this category are the Richmond discovery at Zulia 26-1 in the District of Perija, Zulia and Shell WT-2 discovery in the District of Colon, State of Zulia.

2. Additions to reserves in Lake Maracaibo, particularly by the Shell new-pool discovery at VL-1 and Creole's outposts in the southern part of the LL-370 Eocene reservoirs.

3. The extensive exploration in the State of Guarico in eastern Venezuela without making any large discoveries. Gas seems to be more plentiful than oil in Guarico.

4. The greatest number of new discoveries (6) were made in the greater Oficina area. However, these average small in size, and because of the geologic conditions present the discoveries do not as a rule develop into large fields.

5. The probable new-field discovery of Socony-Vacuum in its San Silvestre No. 2 in the State of Barinas. This would be the first discovery in this large so-called Apure basin of southwest Venezuela. It may lead to more active interest there, as well as intensify interest in the large Llanos basin of eastern Colombia, for the Apure basin is a northward extension of the Colombian Llanos.

6. Lastly, it is important to mention the trend toward deeper drilling in some parts of the country. In both eastern and western Venezuela, but mainly in the latter, the objective is the porous limestone facies of the Cretaceous. However, exploration for deeper productive zones in the Tertiary is also progressing in both eastern and western Venezuela.

No leasing whatever has occurred in Venezuela since the revolution of 1945. During the past year, however, exploration tracts granted under the 1943 law by the Government up to October, 1945, have reached the 3-year exploration limit. Several companies have obtained the 6 months extension that is possible for further exploratory work before parcellation. Some exploitation acreage has been relinquished in the areas considered as not good prospects. In all, approximately 600,000 hectares of both exploration and exploitation acreage was renounced in 1947.

Refineries in Venezuela processed a total of 35,851,000 barrels of crude during the year, compared with 34,783,000 in 1946. There were no new plants built during the year but rapid progress was made with the construction of the Shell's new 40,000 barrel refinery at Punta Cardon and the Creole's 60,000 barrel plant at Amuay Bay, both on the Paraguana Peninsula. Refining capacity in Venezuela at the end of the year was about 125,000 barrels per day.

COLOMBIA

Petroleum production during 1947 totaled 24,973,484 barrels, or 68,420 barrels daily. This was an increase of somewhat more than 3 million barrels over 1946, and compares with a peak production of 25,303,795 barrels in 1940. Total

cumulative production was about 413,176,000 barrels at the close of 1947. The following table gives the 1947 daily and total cumulative production by fields.

Company and Field	*1947 Production*		*Cumulative Production through 1947*
	Total	*Daily Average*	
Tropical Oil Company			
La Cira	9,140,530	25,043	220,206,977
Infantas	2,983,415	8,173	146,062,227
Colorado	106,898	293	172,914
Galan	30,363	83	95,091
S. Luis	—	—	7,996
Mugrosa	—	—	69,838
Colombian Petroleum Co.			
Tibu	4,574,508	12,533	9,965,405
Petroleo North Dome	3,162,938	8,666	26,613,586
Carbonera	11,896	33	144,141
Shell Oil Company			
Casabe	4,775,610	13,084	9,770,827
El Dificil	118,605	325	217,694
Socony-Vacuum Oil Co.			
Cantagallo	24,410	67	167,075
Floresanto	196	0.5	11,171
Las Monas	9,115	25	74,509
Texas Petroleum Company			
Velasquez	35,000	96	35,000
Totals	24,973,484	68,420	413,614,451

The significant rise in production is wholly the result of increases in Shell Oil Company's Casabe field in the Middle Magdalena Valley and Colombian Petroleum Company's (Texas and Socony-Vacuum) Tibu field in the Barco Concession located on the Venezuelan frontier. These fields recorded increases of 1,565,564 barrels and 1,642,428 barrels, respectively, above 1946. Production in Tropical Oil Company's Infantas and La Cira fields, the oldest fields in Colombia, continued to decline. Developmental drilling on these two fields was completed during 1947. Total 1947 production from the four Tropical fields in the De Mares Concession was nearly half a million barrels below 1946.

The intensive geological and geophysical program instituted by the industry at the close of the war continued throughout 1947. The industry completed 488 party months of geological, 72 party months of gravity meter, and 133 party months of seismic surveys. In addition, the Gulf Oil Company started an extensive airborne magnetic survey of northern and eastern Colombia in the second half of the year. At the end of the year this survey was still in progress.

The industry completed 142 exploitation wells during 1947, of which 127 were commercial producers. Completions were distributed as follows: La Cira, 82; Infantas, 13; Casabe, 18; Tibu, 21; two each on Las Monas, El Dificil, and Velasquez; and one each on Cantagallo and Floresanto. The total number of field wells drilled in Colombia stands at about 1,720, of which 1,342 or 78% were drilled in the La Cira and Infantas fields.

Nineteen wildcat wells were completed during 1947, as compared with 16 in 1946; and 8 others were drilling at the end of the year. In spite of the intense wildcat activity, no oil-field discoveries were made during the year. Wildcatting was widely distributed. Wells completed, and wells drilling at the end of the year are briefly reviewed in the following table.

Well	*Company*	*Depth (Feet)*	*Remarks*
*Llanos Basin (large basin east of Andes)**			
Chaviva 1	Tropical	7,824	No oil or gas shows
San Martin 3	Shell	6,481	No oil or gas shows
San Martin 4	Shell	4,098	No oil or gas shows
San Martin 5	Shell	5,135 drg.	
Voragine 1	Shell	6,482	Testing at end of year
Bogota Plateau			
Near Tunja	Tropical	140 drg.	First well on plateau. Cretaceous test 150 kms. north of Bogota
Upper Magdalena Basin			
San Antonio 1	Tropical-Texas	8,355 drg.	No oil or gas shows
Middle Magdalena Valley			
Sardinata 1	Gulf	8,250	Dry hole, abandoned
Sardinata 2	Gulf	7,557	Dry hole, abandoned
Sardinata 3	Gulf	5,896	Dry hole, abandoned
Zahino 1	Gulf	6,737	Dry hole, abandoned
Zahino 2	Gulf	4,690	Dry hole, abandoned
Cantagallo 11	Socony-Vacuum	7,441	Dry hole, abandoned
Lower Magdalena Basin			
Pinto 1	Texas-Socony	11,206	Showings of high pressure methane
Granada 1	Ariguani Company	11,206	Showings of high pressure methane
Granada 2	Ariguani Company	1,427 drg.	
El Dificil 17	Shell	9,528	Small shows. Abandoned in basement
Buena Vista 1	Texas	11,280 drg.	50 kms. east of Baranquilla. No important showings
Tubara 1	Tropical-Socony	8,185	Encouraging showings in both wells
Tubara 2	Tropical-Socony	3,789	Failed to produce
Cesar Valley (Northeast Colombia)			
El Paso 1	Tropical	2,927	No showing. Abandoned in basement
El Paso 2	Tropical	Rigging up	20 kms. north of No. 1
Papayal Basin (Extreme NE. Colombia)			
Papayal 1	Tropical	2,577	Minor showings. Abandoned
Sinu Basin			
Floresanto 10	Socony-Tropical	10,876	Insignificant shows. Abandoned
La Risa 1	Socony-Tropical	3,573	Insignificant shows. Abandoned
Tablon 1	Texas-Socony	9,934	Large dry gas show. Abandoned
Jobo 1	Texas-Socony	6,944	Fishing
San Andres 1	Cities Service-Phillips-Sinclair	5,135	Drilling

* In this large basin east of the high Andes operations were suspended during the year by Tropical Oil Company. A discovery of oil by Socony-Vacuum in San Silvestre No. 2 in a northward extension of the Llanos basin in southwestern Venezuela may serve as an incentive to operators in the Colombian Llanos.

Near the close of the year, Socony's Cantagallo field, located on the west side of the Magdalena River, downstream from the De Mares Concession, was tied to the Andean trunk line. By the end of the year good progress had been made on

the construction of a 6-inch line tying Shell's Lower Magdalena Valley El Dificil field into the Andean trunk line system. Also at the end of the year preparations were under way to carry out an aerial photographic survey of a proposed pipeline route from The Texas Company's Velasquez field to Barranca Bermeja, upstream terminal of the Andean pipeline.

For the past several years informed Government officials, with the industry's support, have waged an active campaign for modification of existing petroleum legislation, to stimulate and facilitate exploration. This campaign continued during the year and resulted in the drafting of a bill which, if adopted, will bring about most of the changes desired. By the end of the year, when Congress adjourned, this bill had cleared the House and was in the hands of the Senate Oil Committee. Another bill of interest to the oil industry was submitted to Congress near the end of the year. This bill will create an official oil company which is to be engaged in all branches of the petroleum industry. By the end of the year the House Committee had approved this bill at first reading.

ECUADOR

Production in Ecuador, all of which is concentrated on the Santa Elena Peninsula, is reported to have been about 6,300 barrels daily, the greater part of which came from the Ancon field. Cumulative production, all from this same area, totals about 41,800,000 barrels. No information is available on developments in these fields during the year.

International Ecuadorian Petroleum Company's exploration activities in Ecuador, which had been carried on for 10 years over most of the basin area between the high Andes and the coast, were terminated during 1947, and the company relinquished its concession holdings and transferred its personnel and materials to other countries. During the 10-year period, International Ecuadorian carried on extensive geological and geophysical studies and drilled 20 wildcat wells, all dry, the last of which was completed at a depth of 5,551 feet in February, 1947, on an anticlinal structure in the Jipijapa-Quininde basin of west-central Ecuador.

Surface study during 1947 was limited to 10 party months by two geologic field parties, which completed their assignments and withdrew before mid-year.

In eastern Ecuador, in the large basin lying in the Amazon drainage east of the Andes, Shell Company of Ecuador, Ltd. continued exploration throughout the year on its 20,615,000-acre concession. Besides geologic and geophysical work the company has completed two tests, one in 1946 and the second in 1947. Two other wildcats have been started and preparations are being made for a fifth test. The two completed wells obtained encouraging oil showings.

PERU

Peru's 1947 oil production of 12,762,811 barrels, or 34,967 barrels per day, showed a slight increase over the 1946 production of 12,468,125 barrels or 34,160 barrels per day. Production was distributed as follows.

Company and Field	*Total*	*Daily Average*
International Petroleum		
La Brea—Parinas Estate	10,205,658	27,961
Cia. Lobitos		
Lobitos and El Alto	2,321,976	6,361
Zorritos (Peru Gov't.)		
Zorritos and Organos	117,176	321
Cia. Ganzo Azul		
Aguas Calientes	118,001	324
Total	12,762,811	34,967

The first three areas are on the coastal belt of northwestern Peru, and the last-named is in the eastern Andean foothills and Amazon headwaters drainage. Cumulative production in Peru totals about 356,129,000 barrels.

There was a post-war decline in Peru's production, which exceeded 14,000,000 barrels in 1943 and 1944. The decline was partly due to a return to normal producing practice, but was more largely the result of failure to find new reserves.

Geological and geophysical activity was approximately as follows, in party months: surface geology, 111; gravity meter-magnetometer, 29; seismograph, 2.5. All of the seismograph work and about 40% of the gravity meter-magnetometer work was done in the La Brea-Parinas Estate. The balance of the geophysical and nearly all of the geological work was done in the large Montana basin east of the Andes.

Approximately 112 exploitation and 30 exploration wells were drilled in 1947, distributed as follows.

	Exploitation			
Company	*Oil*	*Gas*	*Dry*	*Total*
Northwestern Peru				
International	59	1	13	73
Lobitos[1]	35	—	—	35
Government[2]	4(?)	(?)	(?)	4(?)
Sub-total	98	1	13	112
Montana (Eastern Peru)				
Ganzo Azul	0	0	0	0
Total exploitation	98	1	13	112
	Exploration			
Northwestern Peru				
International[3]	7	3	19	29
Lobitos[2]	(?)	(?)	(?)	(?)
Government[2]	(?)	(?)	(?)	(?)
Sub-total	7	3	19	29
Montana (Eastern Peru)				
Cia. Pet. El Oriente	—	—	—	—
Total exploration	7	3	20	30
Grand Total	105	4	33	142

[1] The number of Lobitos exploitation wells is estimated to be the same as they were reported for 1946, as we have no information other than that their operations in 1947 were conducted on a scale similar to that of 1946.

[2] Our information on exploratory drilling by Lobitos and on all drilling by the Peruvian Government is indefinite.

[3] Of the seven exploration wells International completed as oil producers, only three discovered new pools of commercial drillable reserves.

The only well completed in the Montana was wildcat well Raya 1 of Compania La Peruano de Petroleo el Oriente. This well was drilled through Cretaceous rocks to 2,434 feet where it encountered igneous rock. It was abandoned at 2,601 feet as a dry hole without having encountered any showings of oil or gas.

At the close of 1947, six exploration wells were drilling in northwestern Peru on routine exploration in the Estate, and one well was drilling in the Montana or eastern Peru basin. This latter is the Government's Santa Clara No. 1, which had reached a depth of 1,000 feet. This is the second test to be drilled in the Montana outside of Ganzo Azul's Agua Caliente field, and it will be followed with interest. No showings of oil or gas have been reported.

In northwestern Peru all areas not covered by firm concessions (Lobitos and International's properties) are national reserves. International's negotiations with the Peruvian Government for a concession covering a part of these national reserves south of its La Brea-Parinas Estate, known as the "Sechura," has resulted in the formulation of a contract. The contract has been approved by the Senate and is now pending approval by the Chamber of Deputies. The granting of concessions in the Montana has been held in abeyance pending the passage of new petroleum legislation.

The considerable interest of several foreign oil companies in the Montana region in 1945 and 1946 greatly diminished during 1947 as the anticipated new petroleum legislation that would apply to that region failed to materialize. Of the three foreign companies that were conducting actual field work, Shell completely withdrew from Peru, the Socony withdrew all field parties, and International greatly curtailed activities toward the end of the year.

CHILE

Operations for the year were limited to the Magallanes district of southern Chile where the only oil field, Spring Hill, was discovered in 1945 on the northern part of the Island of Tierra del Fuego.

During 1947 exploration activities by the Government Corporacion de Fomento in the Magallanes area consisted of 7 geological party months, 8 seismograph, and 4 gravity meter crew months of study.

Six wells were completed during 1947, all of them development wells on the Spring Hill field. Two of these wells were gas wells, four were oil wells. Wells 11 and 12 which were drilling on the field at the close of the year, were completed in February, 1948, but results have not been reported.

Preparations are being made to start the drilling of two wildcats, San Sebastian and Espora, early in 1948. The first of these locations is 50 miles southeast of Spring Hill field, and the other is at Punta Espora on the coast of Tierra del Fuego, 8 miles north of Spring Hill. Fomento now has three rotary rigs in the Magallanes area.

ARGENTINA

Cumulative production in Argentina amounts to nearly 386 million barrels, of which about 297 million barrels have come from the Comodoro Rivadavia field. Production averaged about 60,000 barrels daily, or an increase of 3,000 barrels per day over 1946. On balance, the increase is due to the exploitation of the Caleta Olivia field, discovered in 1944 south of Comodoro in the territory of Santa Cruz, to an extension of the Challaco field in the territory of Neuquen, and to an increase in production in the Comodoro Rivadavia area. The Government Y.P.F. (Yacimientos Petroliferos Fiscales) percentage of the total production increased from 65% in 1946 to about 70% in 1947. Along with the decline in production, largely due to the difficulty of securing equipment during the war, from 68,000 barrels per day in the peak year of 1943, there has been an increase of crude and petroleum products imports of about 31.5%.

It is estimated that about 185 exploitation and exploration wells were drilled during the year. Several exploration wells were drilled in the Caleta Olivia field, extending the area over which production has been obtained to about 18 kilometers in length and 14 kilometers in width. Fourteen wells produced somewhat over 2,000 barrels daily but about as many dry holes have been drilled in the area. In the Bahia Solana area, 20 kilometers north of Comodoro Rivadavia, 3 gas wells were drilled and shut in awaiting the completion of 1,100 miles of 10-inch gas line from Comodoro Rivadavia to Buenos Aires, construction of which was started in 1947. The line is expected to have a daily capacity of 21,000,000 cubic feet.

The only company doing exploration work is the Government-owned Y.P.F. Both geological and geophysical surveys were being carried out on a somewhat increased scale over 1946. Exploration drilling has been curtailed because of lack of equipment. Y.P.F. is reported to have purchased several new seismographs and expects to intensify its exploration. An exploration well is being drilled in the Subandine ranges at Niquevio Viejo in the Province of San Juan.

In the latter part of the year, a contract was signed between Y.P.F. and Drilling and Exploration Company of Nevada (Brantly) calling for the drilling of 40 exploration wells in various parts of the country.

Imports rose to more than 72,000 barrels daily in 1947. Indigenous production supplied only about 45% of a consumption of about 48,130,000 barrels or 132,000 barrels daily. Argentina has had to purchase from abroad a large proportion of its petroleum for many years because of failure to find the needed reserves in the large potentially oil-bearing basin areas of the country. Foreign capital has been unable to assist in the finding of new fields because of the restrictions for many years on the granting of leases.

BOLIVIA

Production averaged about 1,340 barrels per day during 1947 from the Camiri,

Sanandita, and Bermejo fields along the foothills belt in southeastern Bolivia. Cumulative production is about 3,950,000 barrels. About 30 wells have been drilled in these fields, though about half are said to be shut in. Production at Camiri is from the Devonian and that of Sanandita and Bermejo is from the Permo-Carboniferous.

A new field was discovered in 1947, about 24 kilometers south of Camiri, when Guayruy No. 1 came in at 1,606 feet in the Devonian with an initial reported as 300 barrels per day. The well was drilled at a site selected by the Standard Oil Company of Bolivia prior to the expropriation of their properties by the Government of Bolivia. The oil is said to have a gravity of 57° A.P.I. and a natural gasoline content of 73%. Thus the oil is several degrees lighter than the Camiri oil. A deeper pay sand was encountered at Camiri when well No. 1 was deepened from 3,300 to 3,645 feet.

A test on the Mandiapecoa structure, 25 kilometers east of the Village of Boyuibe, was drilling at about 2,600 feet at the close of the year. Preparations are being made to drill an exploratory well on the Agua Salada structure, 15 kilometers east of the Village of Palmar and 10 kilometers north of the Argentine frontier. Deepening of well No. 1 in the Sanandita field is planned to test the Devonian.

Five exploitation and one exploration wells were completed during the year. Two exploitation and two exploration wells were drilling at the close of 1947.

PARAGUAY

On July 31 the Union Oil Company spudded in its second test, known as La Paz No. 1, on its approximately 23-million acre exploration concession in the Paraguayan Chaco. This well is located about 42 miles east of the first test, Santa Rosa No. 1, which was drilled in 1946 to the total depth of 7,579 feet in the southwestern Paraguayan Chaco, about 40 miles from the Bolivian border. At the end of the year, La Paz No. 1 was drilling in hard black shale at 5,866 feet. The Santa Rosa well was bottomed in this same shale, which is tentatively assigned to a Lower Devonian age. Neither of these wells has had any significant showings.

Civil strife within the country tended to retard exploration activities due to difficulties in moving personnel and supplies. However, one geologist and two reflection seismograph crews were able to operate practically continuously in the Chaco throughout the year, and a third seismograph crew was put into operation the early part of December. All seismograph work was performed under contract by Western Geophysical Company. During 1947 the company purchased a C-47 plane to assist in moving supplies from Asuncion to the various field camps.

Plans for 1948 call for continuous exploration with the three geophysical crews and the probability that additional tests will be drilled after the completion or abandonment of La Paz No. 1.

BRAZIL

Petroleum development and exploration in Brazil during 1947 was practically confined to the activities of the Government Conselho Nacional do Petroleo (National Petroleum Council). Aside from a minor amount of shallow drilling by two national companies, without discoveries, private enterprise awaited the enactment of a new petroleum code or law. This promised new code was under study and elaboration during the year. Hoover and Curtice were retained by the President, as advisers, in the drafting of this code.

During the year, the Conselho Nacional do Petroleo maintained six geological parties in the field, five of which had an American geologist as party chief, with national geologists and engineers as assistants. The study consisted of both reconnaissance and detailed mapping in the northeast in the States of Bahia, Sergipe, Piaui, Maranhao, and Goias. The national geological party spent part of the year in the State of Parana. The geological work in northeastern Brazil increased the detailed knowledge of the Bahia graben stratigraphy, established the presence of a large area of outcropping Devonian sediments in the Maranhao-Piaui basin and the equivalence of the Carboniferous in this basin with that of the Lower Amazon Valley.

The Conselho operated two contract seismograph parties throughout the year. No other geophysical method was used. A Geophysical Service Inc. crew operated with refraction and reflection methods on the Island of Marajo, at the mouth of the Amazon River and in surrounding territory. The shooting on Marajo Island proved the presence of more than 3,000 meters of sediments, under the center of the Island. A United Geophysical Company's crew was used for experimental refraction and reflection shooting in the State of Parana in diabase sill and dike-intruded terrane. The results were unsatisfactory.

The firm of DeGolyer and MacNaughton continued as geological adviser to the Conselho Nacional do Petroleo and maintained a geologist representative in residence in Rio de Janeiro. The J. E. Brantly Drilling and Exploration Company continued to direct drilling and development.

Between 1939, date of oil discovery, and December 31, 1947, the Conselho Nacional do Petroleo drilled 131 wells, or a total of 386,130 feet, in the Bahia embayment, resulting in the discovery of five oil and gas fields. The wells are classified as follows.

Productive oil wells	66
Productive gas wells	14
Dry holes	33
Exploration wells and stratigraphic tests	18

Wells completed in 1947 are as follows.

Exploration

Itaparica No. 27—gas well
Frades No. 1, dry, abd. 1,508 m.
Pitanga No. 3, dry, abd. 1,503 m.
Dom Joao No. 1, discovery well

Exploitation

Candeias field: 19 wells drilled in proved area (18 producing wells and 1 dry)
Dom Joao field: 4 producing wells drilled

Three exploratory drilling operations were in progress at the close of the year, all in the Bahia basin. Two, Pitanga No. 4 and Dom Joao No. 5, were about to be abandoned as dry holes, and the third, Sta. Antonio No. 1, located shortly east of Candeias was drilling in shale at 1,296 meters.

Comments of interest on the oil and gas fields follow.

Candeias field.—This is the best developed field in Brazil, with a productive area of 390 acres and a reserve of about 10 million barrels of oil. The proved area is fairly well known. At the end of the year, 46 wells had been drilled and two were drilling. The plan is to drill about 10 or 15 additional wells to cover this area. The deepest well reached a depth of 1,832 meters. A refinery for 2,500 barrels a day is to be built in this field, and is planned to be in operation by the middle of 1949.

Dom Joao field.—This field was discovered in 1947 about 11 kilometers northwest of Candeias field. Five wells have been drilled, 4 of which are good producers. Oil has been found in four sands for a total reported thickness of 50 meters between the depths of 225 and 350 meters. Reserves to date are said to be about five million barrels. The oil gravity is 39° A.P.I. The last hole drilled was dry, as the productive sands were faulted out.

Itaparica field.—Drilling has been discontinued after 27 wells. Small reserves of oil and moderate reserves of gas. The deepest well attained a depth of 1,921 meters.

Pitanga field.—Four wildcat wells drilled have been rather disappointing.

Lobato-Joanes field contains the discovery well for the Bahia area. The amount of reserves are insignificant. In the field, 17 wells were drilled with the deepest reaching 2,247 meters.

Aratu field has two producing zones, the upper of oil and the lower of gas. The oil reserves are negligible. The gas reserves are 893,861,626 cubic meters. In the field 13 wells were drilled, the deepest being 1,775 meters.

Total production in 1947 by fields in the Bahia graben was as follows.

	Barrels
Lobato-Joanes	7,077
Candeias	84,720
Aratu	2,741
Itaparica	111
Pitanga	84
Dom Joao	2,073
Total	96,806

This total gives an average of 265 barrels per day. These figures have little significance because the wells have been shut down most of the time. The production was solely for the use of the Conselho. Part of the production was processed in a 150-barrel topping plant.

Total Brazilian oil production from 1939 to the end of 1947, all from the Bahia area, was 385,849 barrels.

FIG. 7

EASTERN HEMISPHERE

GREAT BRITAIN

During 1947 the D'Arcy Exploration Company (Anglo-Iranian) continued active exploration efforts and drilled a total of 31,658 feet in 15 wells.

No new fields were discovered and there was a gradual decline in the producing fields to a daily average of 950 barrels for 1947. The total cumulative oil production for Great Britain is 3,850,000 barrels.

Geophysical work by the D'Arcy Exploration Company in 1947 consisted chiefly of seismograph surveys. Exploration efforts by the Anglo-American Oil Company were discontinued, following the abandonment of a test well in the Midlands area.

D'Arcy Exploration Company completed the Perlethrope well in Nottinghamshire in the Millstone grit at 3,750 feet without encountering oil or gas. A well at Coulsland in Midlothian, Scotland, was completed at 1,995 feet but the gas production for which the well was drilled was disappointing due to thinning of sands. A test at Farndon in Nottinghamshire in search of a sand which had showings of oil in a near-by coal boring found the sand lensed out. A well was abandoned at 7,500 feet in the Fornby area of Lancashire where shallow oil had been produced. This is the deepest well in Britain. A test is drilling at Edgmond in Staffordshire on a seismic structure, and another is to be drilled at Willesden, a north London suburb, to assist in interpreting gravity studies of central and western England.

NETHERLANDS

Since the discovery of oil in the Netherlands in 1943, production has totaled nearly 2 million barrels, of which 1,478,000 or 75% was produced in 1947, equal to an average of 4,050 barrels daily. Production is from the Schoonebeek field near the town of Coevorden on a structure which extends into Germany, where it is known as the Emlichheim field. The area proved to date in Holland covers about 2,500 acres. Eighteen exploitation wells were completed in 1947, and the Schoonebeek field was extended farther east. The oil is of 25° A.P.I. gravity and high paraffine content, and it comes from a sand about 100 feet thick in the early Cretaceous Valendis or Valanginian at a depth of about 2,500 feet. Eighteen wells were completed in 1947 for a total of 43, of which 36 are producers. Potential production at the beginning of 1948 was about 6,000 barrels per day.

A brief history of the early search for oil in the Netherlands was given in last year's review. Two seismic and two gravity parties were active at the close of 1947. Three exploration wells were completed during the year. No new discovery was made. Two exploration wells are being drilled. One of these is located west of Coevorden and the other at Delft near the west coast. During 1948 exploration will proceed on a larger scale. Four strings will be put on exploration drilling.

The operations in the Netherlands are being carried on by the Nederlandse Aardolie Maatschappij (N.A.M.), a company formed in September, 1947, and owned equally by the B.P.M. (Royal Dutch) and the Standard Oil Company (New Jersey), the former acting as operator.

FRANCE

The year 1947 saw little change in the oil and gas situation in France and the Colonies. Rehabilitation work on refineries and in the producing areas of Pechelbronn and southwestern France continued. Although active exploration surveys and drilling were carried on by three companies with Government participation, no new fields were discovered.

In the southern part of the Aquitanian basin of southwestern France, the gas field of St. Marcet continued to produce about 20 barrels of 31° A.P.I. paraffinous oil daily from one well, and gas from seven wells with an estimated total for the year of about 6 billion cubic feet. Four deep exploration tests were drilling, but no encouraging showings of oil or gas are reported. The deepest test was drilled to more than 12,000 feet at Puymarin, in the Government company's (R.A.P. or Regie Autonome des Petroles) concession. Geological and geophysical work by seismograph and telluric methods was in progress. An estimated total of about 58,700 feet was drilled in 1947.

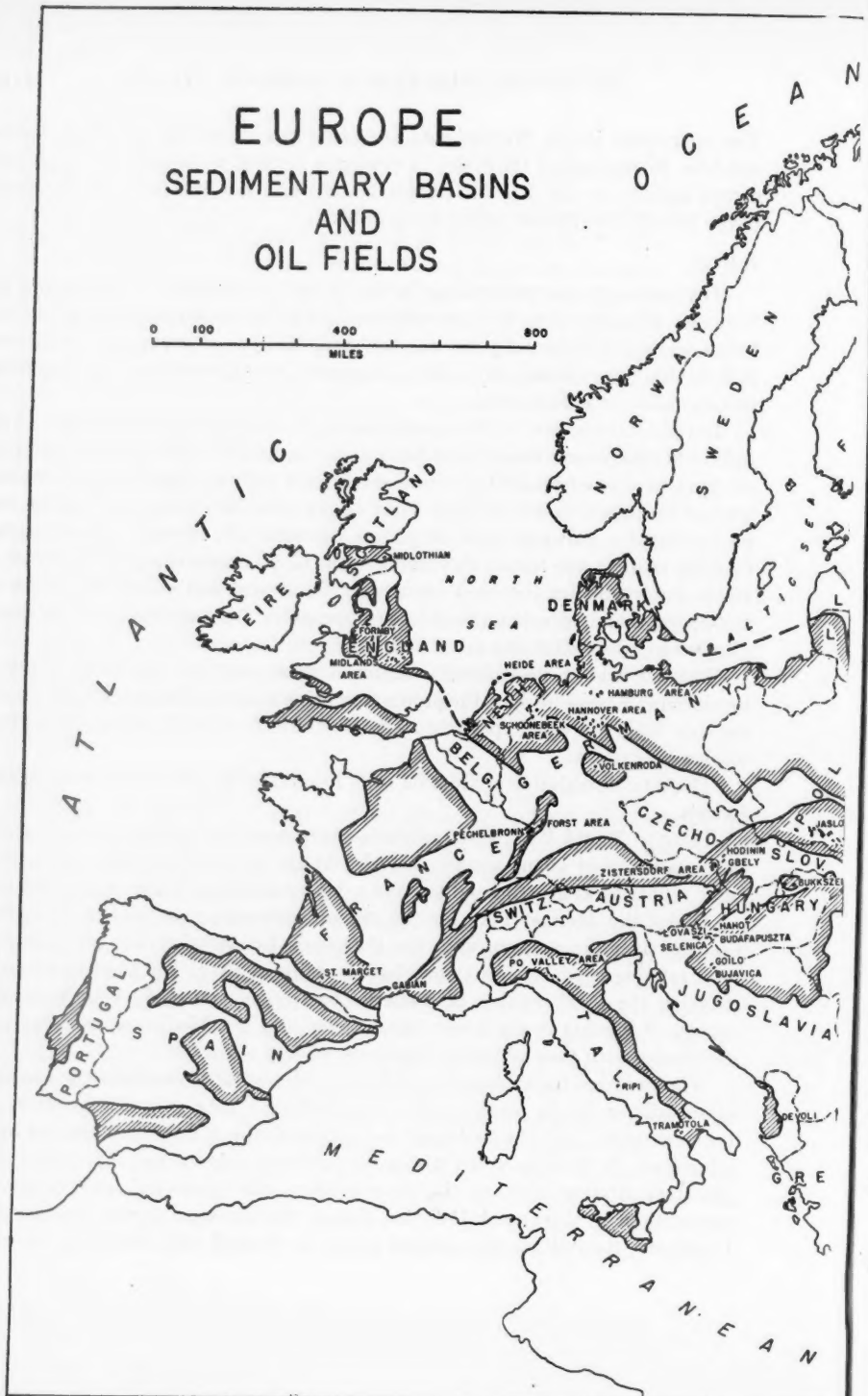
The old field of Pechelbronn continued to account for nearly all of the oil produced in France in 1947, the production being estimated at about 1,000 barrels per day. This is divided approximately two-thirds from wells and one-third from mining operations.

The total cumulative production from France to the end of 1947 is 14,398,000 barrels.

Prior to World War II, 15 refineries were operating in France with a total daily capacity of about 160,000 barrels. At the end of December, 1947, these same refineries were estimated to have a daily capacity of about 108,000 barrels.

Under the Monnet Plan for the economic development of France and her Colonies over the next 10 years, the Petroleum Commission calls for raising the total refining capacity to 256,000 barrels daily in 1955. The plan recommends reducing the total number of refineries to twelve, arranged about two major centers of refining in the lower Seine Valley and the Mediterranean Coast, respectively, with four additional separate refinery sites.

The program for exploration under the Monnet Plan includes the operation of 10 drilling rigs in continental France drilling a total of 480,000 meters in a ten-year period, also the geological and geophysical exploration of 200,000 square kilometers. In French North Africa the program calls for 550,000 meters of exploratory drilling with 15 rigs in operation, also geological and geophysical exploration. In the French Colonies, Gabon, Madagascar, Cameroons, and New Caledonia, the drilling of 2,140,000 meters is planned with 50 rigs in operation.


EUROPE
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DENMARK
FORMBY
ENGLAND
MIDLAND AREA
HEIDE AREA
HAMBURG AREA
HANNOVER AREA
SCHOONEBEEK AREA
VOLKENRODA
BELGIUM
PECHELBRONN
FORST AREA
CZECHO SLOV
JASLO
HODININ
GBELY
ZISTERSDORF AREA
BUKKSZEK
FRANCE
SWITZ.
AUSTRIA
HUNGARY
HANOT
BUDAFAPUSZTA
COVASZI
SELENICA
GOILO
BUJAVICA
ST. MARCET
GABIAN
PO VALLEY AREA
JUGOSLAVIA
PORTUGAL
SPAIN
ITALY
RIPI
TRAMOTOLA
DEVOLI
GRE
MEDITERRANEAN SEA

FIG.

IZHMA
KOZHVA
UST-UKHTA
KAMA RIVER AREA
IVANOVA
TUIMAZY
ISHIMBAEVO AREA
BUGURUSLAN
KINEL
KUIBISHEV
BUZLUK
SYZRAN
YABLONOVI
AKTIUBINSK
PENZA
DSHAKSMAI
SHOBANKUDUK
EMBA AREA
ROMNY
POLTAVA
KASHKARA
BORYSLAW AREA
BITKOW AREA
BACAU AREA
GRIMEA AREA
KUBAN AREA
MAIKOP AREA
GROZNY AREA
DAGHESTAN AREA
SIAZAN
CAPE KILIAZIN
BAKU AREA
PIRSAGET
DUROV DAG
BATUM AREA
TIFLIS AREA
PLOESTI AREA
BULGARIA
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DENMARK

The first deep well to be drilled in Denmark by the Danish American Prospecting Company (Gulf Oil Corporation subsidiary) was Vinding No. 1 in west-central Jutland, 8 kilometers southeast of Holstebro. This well was spudded, July 21, 1947, and drilled to 7,985 feet, at which depth the drill pipe was stuck, and the well was finally abandoned on December 24, 1947. The rig is being moved to a new location, Gassum No. 1, in east-central Jutland, about 45 kilometers north of Aarhus.

Shallow drilling by the Danish American Prospecting Company has continued throughout the year with a Sullivan portable rig and during the last quarter of the year with a Cardwell rig. As a result of this drilling, shallow salt domes indicated by geophysical work have been confirmed in several localities, and rock salt has definitely been reached with the drill on the Vejrum, Suldrup, and Hornum domes.

During the year, a gravity party and a refraction-seismograph party have been in continuous operation. The company also maintains a sizeable geological organization including a stratigraphic laboratory.

GERMANY

Cumulative oil production in Germany totals about 88 million barrels. A daily average production of 11,500 barrels in 1947 is comparable with 12,525 barrels daily in 1946. Fully 95% of the German oil industry is located in the British zone of northwest Germany under the North German Oil Control. Included here is nearly all of the production and most of the refining industry. The latter is largely in the Hamburg area.

The three main oil provinces and their approximate present proportions of production are:

District	*Percentage*
Schleswig-Holstein-Hamburg	16.5
Hanover	16.0
Emsland (Netherlands border)	18.5

The only production outside of northwest Germany is about 125 barrels daily from two small Baden fields in the Rhine Valley (French zone) and a few barrels a month from the Tegernsee area of Bavaria, South Germany, in the American zone. There is no oil production in the Russian zone, but several oil-synthesis plants are in partial operation. Production in Germany is distributed about 66% among many private German firms, 22% by the two foreign firms, the German Vacuum Oil Company and Brigitta (50% Shell and 50% Standard Oil Co. (N. J.)), and 12% by three Government-controlled companies.

Increase in the production of the now promising Emsland district was more than offset by declines in the other districts. All areas are affected by shortage of steel, lack of spare parts, inadequate labor and transportation, poor food and consequent low morale. Many men have been or still are in denazification and

Russian prison camps. Production in the old Hanover district is reported to be something like 18% below 1946. Footage drilled in Germany in 1947 totaled about 370,000 feet, which is comparable with about 259,000 feet in 1946.

There is little accurate information on exploratory developments. The area of

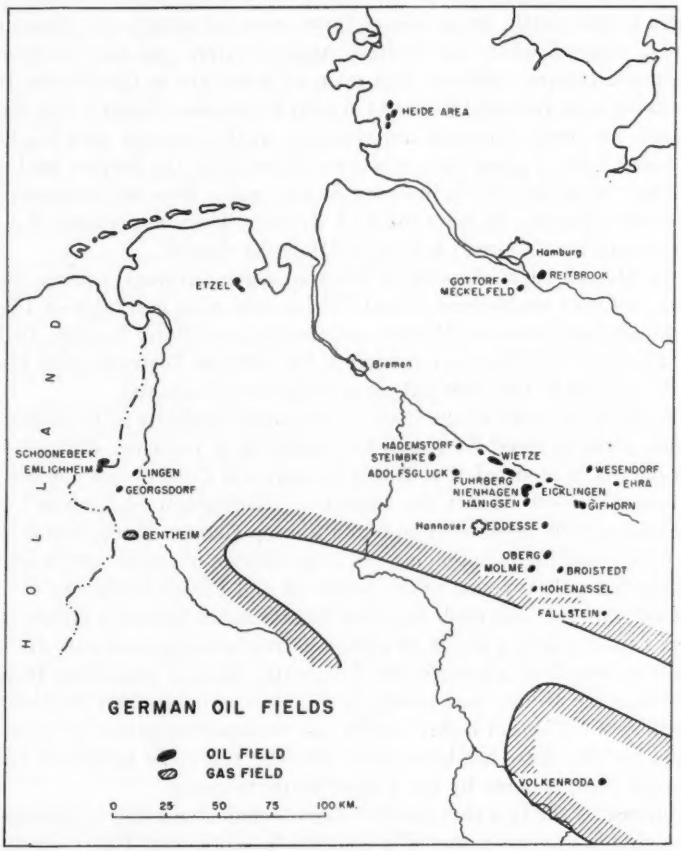


FIG. 9

brightest promise at present is the Emsland district, offsetting the Netherlands frontier where reserves to-day are reported at about 28,500,000 barrels proved and 30,375,000 barrels probable. These estimates by the geological office at Hanover are comparable with their estimates for the rest of north Germany of 17,810,000 barrels proved and 2,700,000 barrels probable. The greater part of the Emsland proved reserves appears to be in the Emlichheim field. Oil showings

at Apeldorn and Itterbeck are reported to encourage hopes of new fields in the Emsland area. Two other tests are reported drilling, one at Ems and another at Georgsdorf a short distance southwest.

From the data available, there appear to have been no important discoveries in the old Hanover district of Lower Saxony or in the Schleswig-Holstein-Hamburg area on the north. Structures of these areas are largely salt domes or salt anticlines, most of which are faulted. Approximately 200 salt structures are known in the Hanover district. The main oil zones are in the Middle Jurassic Dogger and Upper Jurassic Oölite and in early Cretaceous Valendis and Wealden. Most fields are small. The best new discovery in the Hanover area is said to be in the Lower Lias at 5,500 feet, which would be about the deepest field in Germany. Other tests are drilling in Lower Saxony and a deep test is reported to be planned near Bassum, 20 miles south of Bremen. There are reports of a recent deep discovery by a German firm in the Hanover district.

In the Munich basin of southern Bavaria, south Germany, interest has been renewed, and tests are planned at Bad Tolz, several miles northwest of Tegernsee in the Alpine front between Munich and the Austrian Tyrol frontier. Drilling is reported to have been resumed at Kirchbickel, south of Dietramzell by Deutsche Erdol, A. G., one of the principal pre-war German companies.

With the break-down of the Council of Foreign Ministers in December, 1947, expansion plans to speed the search for needed oil in Germany will probably be carried out. It is reported that North German Oil Control has applied to the Joint Export-Import Agency for import of seismograph equipment from the United States. New fields must be found to keep German production at present levels, to say nothing of supplying the large balance of requirements which has been imported at heavy cost to the American and British taxpayers.

A good start has been made on rebuilding refineries destroyed during the war. Refinery capacity is now about 10 million barrels annually, and this will be substantially increased with completion of presently planned rebuilding. Increase of imports from the Middle East to supply this oil is probable. This local refining of crude will save millions of dollars on the cost of importing products, a cost which since the United States has taken over virtually the whole burden of financing the Bizonal area, is borne by the United States taxpayer.

Of interest is the fact that the first open technical meeting of geologists and geophysicists in 15 years gathered in Hanover in September. Thirty-seven papers discussing 26 oil fields and other subjects, and reviewing the very extensive knowledge of the subsurface gained by the great amount of drilling of the last 15 years, constitute a comprehensive review of German oil geology. At this meeting were organized two new societies: the German Society for Science of Petroleum, and the German Geological Society for the Bizonal Area.

POLAND

Production in Poland, one of the oldest oil-producing countries of the

world, totals about 268,382,000 barrels. The bulk of this oil has come from the Boryslaw field of eastern Galicia, discovered in 1899. This field, along with other lesser fields, lies in that part of Poland added to Russia in 1941, a transfer that was confirmed by the Yalta and Potsdam agreements. Production in present-day Poland approximated 2,600 barrels/day in 1947, which is comparable with about 2,200 barrels daily in 1946 and 9,058 barrels per day in pre-war Poland in 1939. Production in 1939 was just sufficient to supply the country's limited requirements. To-day, Poland's oil and gas needs, not supplied by her own small production, are imported from Galicia, Roumania, and Hungary. Oil forms the largest single item in Poland's imports from Hungary and Roumania.

Following the establishment of a new Government in Poland in 1945, the entire oil industry was nationalized. Within present-day Poland there are 38 small fields with a total of about 2,400 producing wells. Current production thus averages but little more than one barrel per well per day. In addition, there are in Poland of to-day five gas fields with a total daily production of about 18 million cubic feet of gas.

Developmental drilling within present fields has been almost entirely completed, and secondary recovery, mainly through repressuring, is being applied with generally good results. Proved reserves are reported to be about 15 million barrels. Poland's oil industry received little direct war damage, but it suffers from worn-out and antiquated plant and equipment. Several rigs are reported to have been purchased from the United States for exploration in 1947.

Seventy wells were drilling in Poland at the close of 1947, of which 25 are classed as exploratory. All of the Polish oil fields lie along the sinuous Alpine-Carpathian foothill belt that swings from Switzerland through south Germany (Bavaria), Austria, Czechoslovakia, and Poland into Roumania. The structures of the Cretaceous to Oligocene clastic Flysch series which carries the oil sands are overfolded and overthrust. Nearly all of the exploration has been in this belt, the more favorable part of which lies in that part of old Poland taken by Russia.

The present nationalized Polish industry has been actively exploring for oil sufficient to supply the internal requirements. Thus far, this effort has resulted in the finding of a gas field near the Czech border at Cieszyn. Prospects for further gas development in the Tertiary basin in front of the Carpathians appear good. Gas was recently found in the Jurassic basement beneath the Tertiary basin in front of the historical oil-producing belt of Poland, and some drilling has been started near Innowroclaw in the prolongation of the north German Cretaceous-Tertiary basin into northwestern Poland.

AUSTRIA

Cumulative oil production since operations began in a small way in 1934 totals about 47 million barrels. Production of oil and gas by fields for the year 1947 was approximately as follows.

Field	Estimated Daily Average, June, 1947 (Bbls.) Oil	Estimated Daily Average, Dec., 1947 (Cu. Ft.) Gas	Estimated Total for 1947 (Bbls.) Oil
Gaiselberg	2,565		934,700
Rag	585		213,800
Gosting	1,935		703,900
Van Sickle	630		227,700
Hauskirchen	7,130		2,598,600
Muhlberg	2,810		1,016,400
St. Ulrich	447		162,600
Maustrenk	447		162,600
Scharfeneck	—		—
Hohenruppersdorf	89	1,235,500	32,500
Aderklaa (gas)	22	2,329,800	8,200
Alt Lichtenwarth (gas)	—	1,000,000	—
	16,660		6,061,000

The production of 16,660 barrels per day for 1947 is comparable with 11,875 barrels daily for 1946.

All of the Austrian oil fields are localized along the major north-northeast trending Steinberg fault system along the west side of the Vienna basin. Accumulation is found in Miocene beds and in the immediately underlying highly folded Flysch (Upper Cretaceous to Oligocene) which forms the basement of the basin in this area.

During the year 1947 the Russians carried on exploration and exploitation activities in their zone of occupation, which covers the eastern half of the North Alpine basin, the Outer Vienna basin, the Vienna basin, and the eastern part of the Graz basin. In the remaining prospective areas of Austria (the western half of the North Alpine basin in the American zone and the western part of the Graz basin in the British zone) exploration work was, and still is, at a standstill pending the forthcoming State Treaty, at which time it is expected that new mining regulations will be issued and exploration concessions granted to interested companies. All rights to former exploration concessions were cancelled at the end of the war and the only leases recognized by the Austrian Government at this time are the small exploitation blocks covering those fields which were discovered prior to 1938.

Since the occupation in 1944 the Russians have drilled about 20 productive wells in the oil fields, about 6 exploration wells, and have deepened 2 or more wells which were started during the war. No new fields or important extensions were discovered. These fields were largely developed by the Shell, Socony-Vacuum, and other private interests, but their operation and production have been taken over by the Russians.

During 1947 about 6 exploitation wells were completed in the Vienna basin fields and 2 or 3 exploration wells were drilled, one of which is in the Outer Vienna basin. Along with this activity, about 4 counterflush core drills were in

operation for structural data in both the Vienna and Graz basins, and a seismic party worked in the Russian part of the Graz basin and in the western part of the Little Hungarian Plain of Hungary in the last half of the year.

At the end of 1947 the activity was as follows.

Equipment in Use	*Basins (Russian Zone)*				*Total*
	Vienna	*Outer Vienna*	*North Alpine*	*Graz*	
Exploitation rigs	6(?)	—	—	—	6
Exploration rigs	2	1	—	—	3
Core drills	3	—	—	2	5
Seismic	—	—	—	1 crew	1
Geological parties	—	—	—	Field geology	—
Total	11	1	—	3	15

Austria's peak production of about 23,000 barrels daily in 1944 was developed feverishly by the Germans on productive and prospective acreage blocked out by private capital in the years immediately preceding German occupation. On the entry of the Red Army, the greater part of the available drilling and production equipment not actually in operation was carried away. Relatively few drilling rigs remain in the country and most all equipment is in poor condition. Control of oil production was delegated to an agency of the Soviet Government known as the "Soviet Mineral Oil Administration in Austria" (SMOA). Under SMOA the policy of the Germans of developing and producing at the maximum possible rate regardless of the ultimate effect on reserves was continued. The increase in production in 1947 over 1946 is the result of this practice and not to the discovery of any new fields.

A core-drilling campaign was begun by SMOA in 1946 in the Burgenland district of southeastern Austria and continued through 1947. This has constituted the principal exploration in Austria in recent years. Although some 40 exploratory wells have been drilled in the past 13 years in areas of Austria outside of the Vienna basin, no commercial fields have resulted therefrom.

HUNGARY

Cumulative production in Hungary totals about 39 million barrels, nearly all of which was produced in the past ten years. Production of an average of 11,900 barrels daily in 1947 was a 15% drop from the 14,100 barrels/day recorded for 1946. The production is divided between the three producing fields, properties of MAORT (Standard Oil Company (N. J.)), as follows.

Field	*Year Discovered*	*Cumulative*	*1947 Production*
Budafapuszta (Lispe)	1937	15,873,808	1,235,554
Lovaszi	1940	20,131,417	2,625,151
Hahot	1942	2,818,034	468,660
Total		38,823,259	4,329,365

Two fields, Ujfalu (MAORT) and Bukkszek (Hungarian Government), which had produced minor amounts of oil were abandoned in 1944 and 1945, respectively.

The decline in production through 1947 was due to several factors. These were mainly the inability of Lovaszi to make up for the decline of Budafapuszta, which had been practically drilled up by 1943, the small production or failure to find oil in new wells drilled at Hahot and the over-production and other inefficient practices of the Germans during the war and of the Russians subsequently. Russian military control of the oil fields was discontinued early in 1947 but MAORT was forced to continue a high level of production through the Hungarian Government. The price of the crude oil was also determined arbitrarily by the Government. Data on exploration in Hungary during 1947 are incomplete. MAORT drilled several exploratory wells on its concession in Transdanubia (southwest Hungary). Four gas wells were completed in Pliocene sands at Ederics on the Hahot structure about 2 miles west of the oil-producing area. Other wells which had been drilled to the top of the Mesozoic without finding oil were completed in the Pliocene as potential gas producers. A total of nine wells completed in the gas zone have a potential capacity of about 27 million cubic feet of wet gas. It is hoped that the gas occurrence may be connected with an oil pool.

A test drilled at Vetyem, 4 miles east of Lovaszi on a secondary gravity anomaly on the main Budafapuszta anticline, obtained some gas and further tests were planned for possible oil production. Two dry holes were drilled at Igal, about 50 miles east of Lispe on a geophysical prospect indicating a buried hill.

Not much is known about the drilling activity of the Masovol (Hungarian Soviet Oil Company) operating in the Great Hungarian Plain. One well was drilled on a long known gravity maximum at Bugyi, 20 miles south-southeast of Budapest. The well hit Mesozoic limestone at shallow depth. Other tests of Masovol, the exact locations of which are not known, also failed to find oil in commercial quantities.

ROUMANIA

Total crude production for 1947 is estimated at about 29,000,000 barrels. Average daily production was about 78,000 barrels, as compared with about 86,000 barrels in 1946. No new reserves of importance were discovered during the year, all additions representing minor extensions in old fields. In fact, no new fields have been discovered since 1936. Unless important new discoveries are made, the decline, which has been going on since the 177,984 barrels per day peak production of 1936, will continue. Cumulative production totals about 1,172,445,000 barrels.

Geologic activity for the year 1947 is estimated at 114 party months. Geophysical crew months are estimated at 18 gravity and magnetic, and 6 seismic.

Fifty-two exploitation wells were drilled and completed during 1947, of which 46 were oil wells, 1 was a gas well, and 5 were dry holes. Three exploration wells

were drilled, all dry holes. In addition, there were a great many work-overs.

The industry has 6 new wildcat locations planned for 1948 and lists 9 hold-overs from 1947. This does not include several step-out locations often listed as exploration wells or any wells that may be planned to find deeper producing zones.

The year was one of great difficulty for the oil operators, who were forced to the limit by the Government to increase production with worn-out drilling and transportation equipment and who received in payment for the oil only about 65% of the cost of producing it. The more important proved reserves in all the fields had to bear the load, all available proved locations being used as fast as possible. Such drilling has retarded the production decline, but can not long continue to be a factor. Besides, the equipment is unable to maintain the drilling planned, and the importation of new rigs will be limited due to lack of funds arising from the restrictions on crude export and on trade in general.

Leasing activity has been greatly restricted, and prices for the acreage which could be traded for have been excessively high. The regulations governing the sale of subsoil rights are so onerous that transactions by foreign-owned companies are largely impossible. Awards of Government lands at auctions have been at high prices. The exploration concession awards have had to favor the groups in the Russian-controlled Sovrompetrol which dominates the industry.

RUSSIA

Figures of oil production in Russia are, at best, only approximations. Reports indicate a daily production in all of Russian territory, including Sakhalin, of nearly 525,000 barrels. This agrees with other reports of a production increase of 15–17% above 1946, when the daily yield was 450,000 barrels. Cumulative production in Russian territory was approximately 5,784,000,000 barrels at the close of 1947. In addition to the daily production, consumption demands in Russia called for a large part of the 107,000 barrels daily production of Roumania, Austria, and Hungary, which oil was taken as part of reparations payment to Russia.

Present production of around 525,000 barrels daily in Russia represents an increase of 31–38% from the low level, variously given as 380,000 to 400,000 barrels daily, reached in 1945 as a result of the war, and it is comparable with a pre-war production of approximately 611,000 barrels daily attained in 1939. Russia's 1947 production is about 44% of that of Venezuela and is comparable with 422,000 barrels daily in Iran, fourth largest producing country, or with about 856,000 barrels daily for the entire Near and Middle East region.

The great falling-off of production during the war was not due entirely to capture of oil fields by the Germans, since the total pre-war production of the captured Maikop and Grozny fields was only about 100,000 barrels daily. Other factors accounted for an equally large or larger part of the decline. These were primarily the great decline in the percentage of wells drilled for prospecting, the lack of materials and equipment to maintain normal operations, and the natural

decline of production in the main producing area of Baku on the Aspheron Peninsula, which celebrated its 75th anniversary as a commercial oil-producing area in 1946.

It appears that Russia maintains her production by assigning a larger percentage of the total number of rigs to random or wildcat drilling than is the case in most countries. Decrease in this drilling during the war brought a decrease in new or flush production and average well yield. Actually, the number of prospect wells drilled in 1946 was less than before the war even though the number of rigs drilling on prospects had considerably increased, according to the reports. With the Russian capture of the oil fields of Roumania, Hungary, and Austria, much drilling, producing, and other equipment was removed from those fields and taken into Russia.

Baku's production declined from a pre-war total of 440,000 barrels daily in 1939, or 72% of all Russian production, to 234,000 barrels, about 60% of total, in 1945. Under the current 5-year plan, production for 1950 figures at only 332,400 barrels daily, or 47.5% of the 700,000 barrels daily production which the plan envisages for 1950. The total Caucasus belt, including the Maikop, Grozny and Dagestan areas along with Baku, produced 89% of Russia's oil in 1939, about 70% in 1945 and, under the current 5-year plan, is expected to produce 60.8% of the 700,000 barrels daily production called for in 1950. Actually the Baku fields have produced a little more than 4 billion, or about 70% of the 5,784 million barrels cumulative in all of present Russian territory.

With the large decline in the Caucasus fields, production has grown in the Ural-Volga, or so-called "Second Baku," fields from 38,000 barrels daily (6.3%) in 1939 to 57,000 barrels (15%) in 1945, and is expected to reach 200,000 barrels daily, or 28.6% of total production in 1950. Other areas of Russia, largely in Asia and mainly in the Transcaspian region, produced about 28,000 barrels (4.7%) daily in 1939, 48,000 barrels in 1945 (12.5%), and is in the plan to produce 74,600 barrels, or 10.6% of the anticipated 700,000 barrels daily production in 1950. Production for the entire island of Sakhalin north of Japan, the southern half of which belonged to Japan prior to the close of World War II, totaled about 12,000 barrels daily in 1939, and increased to about 18,600 barrels per day in 1947. Production from Sakhalin is not included in the 700,000 barrels per day total for 1950 under the current 5-year plan.

We have seen no reliable figures of production for the Ural-Volga region in 1946. Production in 1946 was reported at about 67,500 barrels daily. It is probable that the percentage of the 525,000 barrels daily for 1947 has not increased greatly from that of 1946. Thus, there may seem to be some question whether the 200,000 barrels daily envisaged in the 5-year plan for 1950 will be attained. Production in the Ural-Volga fields is largely from reef limestones of Permian to Devonian age, whereas the Caucasus and other fields in Russian territories produce almost entirely from Tertiary sands.

Along with the increased attention to the Ural-Volga region, not only for oil but for industrial development, it is reported from Moscow that the Port of

Makhach-Kala on the Caspian terminus of the pipeline system will be greatly expanded. This pipeline system runs westward on the north side of the Caucasus through Grozny and Maikop to the Black Sea port of Tuapse, with a branch running on into the industrial region of the Ukraine. It would seem that enlargement of Makhach-Kala, to surpass the port at Baku in importance, as reported, would permit greater movement of oil either from the Volga region down into the Caspian and westward toward the Black Sea and Ukraine or from the Caucasus fields northward up the Volga to the new industrial centers of the Ural region.

Various "guestimates" have been made of Russia's proved petroleum reserves. These have ranged anywhere from 3 or 4 to 10 or more billion barrels. In a recent paper delivered before the Eastern Section of the American Association of Petroleum Geologists in New York, as quoted in the *Oil and Gas Journal* of December 20, 1947, F. Julius Fohs gave an estimate of about 8 billion barrels proved reserve. Calculations, based on present daily output, indicate that this figure may be too high, or at least it seems that a reserve of that magnitude would support a larger daily production. This certainly seems to follow if the tendency of the Russians to over-produce the captured fields of eastern Europe reflects the practice in the Russian fields.

If we accept a figure of 8 billion barrels of proved reserves, the 1947 production of around 192 million barrels was only 2.4% of the proved reserves. By way of comparison, United States production of 1,853 million barrels in 1947 was about 8.5% of the country's proved reserves of about 22 billion barrels. Assuming the same 8.5% ratio of production to proved reserves in Russia as in the United States, Russian proved oil reserves would on this basis be only about 2,315,000,000 barrels. It seems likely that proved reserves are somewhat larger than this figure, however, and that the discrepancy, based on the method of calculation just used, may be due to the lack of equipment *et cetera* for development and removal of the oil found.

ITALY

Production in Italy since the beginning totals only about 3,326,000 barrels. Production in 1947 ran at the rate of about 250 barrels daily from more than ten fields. Production was slightly less than for 1946, due to the absence of new discoveries. Total gas production for 1947 was 93 million cubic meters (3,284,202,000 cubic feet), which was a considerable increase from the 2.5 billion cubic feet reported for 1946. A further increase in gas production can be anticipated, but no oil discoveries of any importance have been made since 1934.

There was a reduction in surface geologic activity. Only about 21 party months are reported for the industry. Principal interest was in subsurface stratigraphy during the year. Geophysical work consisted of about 22 seismic and 12 gravity-meter crew months.

Lively drilling activity is reported among most of the small operators in the eastern Po plains for the exploitation of the 200–2,000 feet of Quaternary gas sands. Drilling activity among the larger companies in the Po basin was com-

paratively reduced. Societa Petrolifera Italiana (Standard Oil Company (N. J.)) drilled one wildcat to 3,976 feet south of Venice Lagoon, and Azienda Generale Italiana pel Petrolio (Government) drilled two step-outs on the Lodi gas field. Eight exploitation wells (including deepenings) were completed on old fields. At the close of the year S.P.I. was rigging up on two wildcats north of Malalbergo, and A.G.I.P. was drilling a test on the Ripalta structure north of Lodi and rigging up for a test on a structure east of Piacenza.

Leasing activity has been relatively intense but the issue of new permits has been kept in abeyance, pending clarification of certain points in the mining regulations. The status of permits at the end of 1947 was obscure.

SPAIN

Spain has had no commercial oil production to date. Minor amounts of oil have been recovered in the past from outcropping sands and small shallow-well showings. The operation of main interest in 1947 was the drilling of the Ciepsa (50% each Socony-Vacuum and Cepsa, a private Spanish Company) well at Oliana in the Ebro basin along the foothills of the Pyrenees in northeastern Spain. This well began drilling at the middle of the year on a large anticline in Eocene sediments, and had reached a depth of 6,294 feet at the end of the year.

In the Zamanzas Valley in the Province of Burgos in north-central Spain, Campsa (Spanish Government petroleum monopoly) completed Zamanzas No. 3 at 2,640 feet with a light rig on a large structure about 90 kilometers north of the city of Burgos. A small amount of heavy black oil, along with salt water and traces of gas, was found in Wealden sandstone, below which the well drilled into Liassic limestone from which 68 barrels of light oil were swabbed at the rate of about ½ barrel per day during a 4 months' test. Impresa "ADARO," a Government organization which operates the mineral industries in Spain, has been drilling at shallow depth with a light rig near Chiclano de la Frontera, south of Cadiz in the Seville-Cadiz basin in southwest Spain.

Surface geological work, amounting to a total of 53 party months, was carried on in north Spain in 1947 by Campsa and Ciepsa.

PORTUGAL

Oil-prospecting operations, carried on intermittently over a considerable number of years and interrupted during the war, are being resumed by the Anglo-Portuguese Oil Company. A new location for a deep well was made about a mile west of Torres Vedras, about 25 miles northwest of Lisbon. This is the only active operation in Portugal.

NIGERIA

During the year the exploration licences in Nigeria, held for several years before the war by the D'Arcy Exploration Company (Anglo-Iranian) and Shell Overseas Exploration Company, were revived, and the companies renewed exploration work.

AFRICA
SEDIMENTARY BASINS
AND
OIL FIELDS
0 500 1000 1500
MILES
MEDITERRANEAN SEA
ATLANTIC OCEAN
INDIAN OCEAN
RED SEA
MOROCCO
ALGERIA
TUNIS
LIBYA
EGYPT
RIO DE ORO
FRENCH WEST AFRICA
NIGERIA
GOLD COAST
LIBERIA
FRENCH EQUATORIAL AFRICA
EGYPTIAN SUDAN
ERIT.
ABYSSINIA
BR. SOM.
ITALIAN SOMALILAND
BELGIAN CONGO
UGANDA
KENYA
TANGANYIKA
ANGOLA
RHODESIA
MOZAMBIQUE
MADAGASCAR
SOUTH-WEST AFRICA
BECHUANALAND
UNION OF SOUTH AFRICA

FIG. 10

Nigeria is a British West African Colony, about ½ million square miles in area, bordering on the great Gulf of Guinea and extending inland to Lake Tchad.

It is drained by the Niger River and tributaries, which river system debouches in a large delta area, beneath which, laterally along the coast, and inland from which Tertiary-Cretaceous marine sediments of considerable thickness extend. The greater part of interior Nigeria is underlain by old basement rocks and igneous intrusives, over which Cretaceous and Tertiary sediments fill limited trough extensions.

MOROCCO

Petroleum development in Morocco for 1947 was conducted entirely by the Societe Cherifienne des Petroles, a French Government-controlled company. The small oil fields of Bou Draa, Tselfat, and Ain Hamra are reported to have produced 23,000 barrels during 1947. The company is energetically prospecting in the region around Petitjean, using magnetometry, gravimetry, seismography, and several drilling rigs.

A new field, called Beau Sejour or Oued Beth (about 15 kilometers southeast of Petitjean), was discovered during November, 1947, but is not yet being produced commercially. The discovery, well No. 7, was reported to show a daily production of about 125 barrels in a basal Miocene sand overlapping a Paleozoic buried hill. Well No. 8 was reported drilling in early 1948 in red shale and anhydrite at 3,700 feet.

ALGERIA

Petroleum development in Algeria is being conducted exclusively by the Societe Nationale de Recherches et d' Exploitation de Petrole en Algerie (Repal), in which the French and Algerian governments are equally represented. Geological work was carried on in 1947 to the extent of about 120 party months. Twelve core holes, a total footage of about 13,000 feet, were completed on four structures in 1947.

One well was completed with a light rig at 2,166 feet in the Chelif basin, and one well, El Biod No. 1, was drilling at 2,394 feet in Miocene shale west of Orleansville in the Chelif basin at the end of the year. Repal has several drilling locations on Tertiary structures, and drilling will be continued with their two rigs in 1948. Most of the interest of Repal is in the narrow Chelif basin between Algiers and Oran in northwestern coastal Algeria, where several wells were drilled and abandoned by the Pearson interests between 1920 and 1924. Repal is also making stratigraphic studies in other parts of Algeria.

About 1,000 barrels of 50° Bé. gravity Miocene oil were produced from three pumping wells in the Tliouanet field of the Chelif basin in 1947.

TUNISIA

The French Government-controlled Syndicat d'Etudes et de Recherches Petrolieres en Tunisie (SEREPT), affiliate of the Cie. Francaise des Petroles of

France, was the only company active in prospecting in Tunisia in 1947. Geological and geophysical work, to the extent of 40 geological party months and 12 gravity-meter and 6 telluric crew months, was completed in 1947. No wells were completed during the year. An exploration well, Haroune No. 2, was spudded in May, 1½ miles southwest of the coastal town of Bizerte, and was drilling at 3,950 feet in Miocene shale at the end of the year. SEREPT is also rigging up for a deep test on Cap Bon, and plans to continue with a 2-rig drilling program during 1948.

ETHIOPIA

The Sinclair Petroleum Company announced in February, 1948, that it had suspended temporarily all its operations in Ethiopia where, in 1945, the company had received a 50-year exploratory concession. About 50 Americans, including drilling personnel and others engaged in exploratory work in the Ogaden Desert area were withdrawn. Officials said the move was made because of disturbances, in neighboring Somaliland. During 1947 the company carried on surface geological reconnaissance and plane-table detail. A large drilling rig had been moved in shortly before operations were suspended.

EGYPT

The Gulf of Suez district continued to be the only producing area in Egypt and the Ras Gharib field maintained its position as leading producer during 1947. Production averaged 25,201 barrels per day during the first 11¼ months, increasing to 30,347 barrels per day during the last 3 weeks when the Sudr field was placed on production. Cumulative production totals 106,759,000 barrels.

Ras Gharib averaged 24,239 barrels per day; Hurghada continued to decline, averaging 962 barrels per day; and Sudr produced at 5,142 barrels per day during the 3 weeks it was on production. Although Ras Gharib is declining slowly, the development at Sudr seems to give assurance that Egyptian production during 1948 will remain at least at the 1947 year-end average of 30,000 barrels per day.

No new producing areas were discovered during the year. However, at the end of the year Asl No. 2, located on the east coast of the Gulf of Suez, 18 kilometers south of Sudr, was testing encouraging showings of oil in the basal Miocene at 3,910 feet. Development drilling continued at Sudr with five wells, of which four were producers having initial production ranging from 400 to 3,500 barrels per day. Oil is being produced from the basal Miocene and upper Eocene series.

Wildcat and exploration wells active during the year are here listed.

SUMMARY OF WILDCAT WELLS

Begun and completed in 1947	2
Begun in 1946 and completed in 1947	5
Begun in 1947 and still drilling or testing 12/31/47	3
Total	10

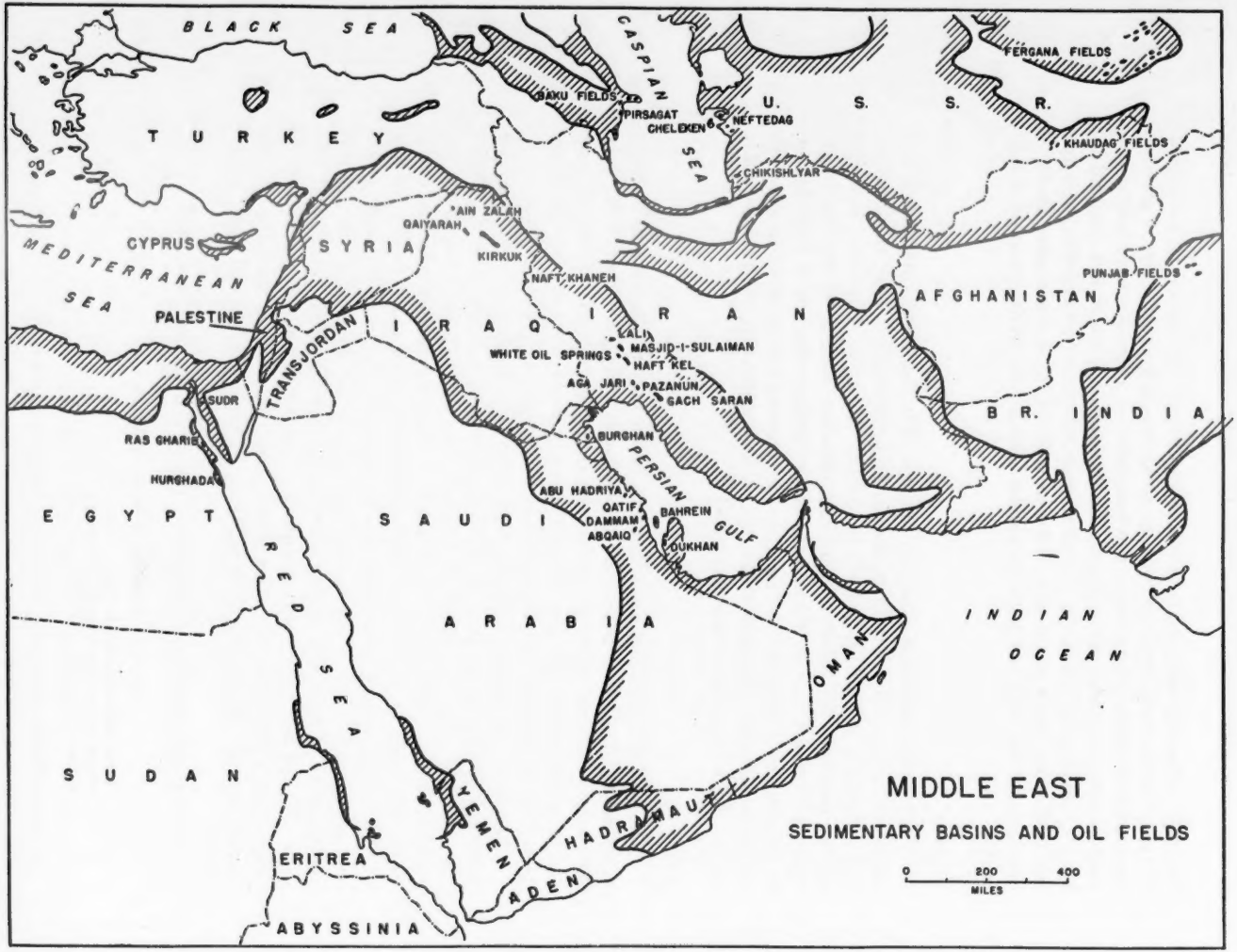

BLACK SEA
CASPIAN SEA
U. S. S. R.
FERGANA FIELDS
BAKU FIELDS
PIRSAGAT
CHELEKEN
NEFTEDAG
KHAUDAG FIELDS
TURKEY
CHIKISHLYAR
AIN ZALAH
GAIYARAH
CYPRUS
SYRIA
KIRKUK
MEDITERRANEAN SEA
NAFT KHANEH
PUNJAB FIELDS
AFGHANISTAN
PALESTINE
TRANSJORDAN
IRAQ
IRAN
LALI
MASJID-I-SULAIMAN
WHITE OIL SPRINGS
HAFT KEL
AGA JARI
PAZANUN
GACH SARAN
B R. I N D I A
SUDR
RAS GHARIB
BURGHAN
PERSIAN GULF
HURGHADA
ABU HADRIYA
QATIF
DAMMAM
BAHREIN
ABQAIQ
DUKHAN
EGYPT
SAUDI ARABIA
RED SEA
OMAN
INDIAN OCEAN
SUDAN
YEMEN
HADRAMAUT
ERITREA
ADEN
ABYSSINIA
MIDDLE EAST
SEDIMENTARY BASINS AND OIL FIELDS
0 200 400
MILES

FIG. 11

SUMMARY OF EXPLOITATION WELLS

Field	Producers Drilled During Year	Drilling or Testing 12/31/47	Dry Holes Drilled During Year
Ras Gharib	8	1	0
Hurghada	0	1	0
Sudr	3	2	1
Total	11	4	1

Three companies, the Socony-Vacuum Oil Company, Inc., the Standard Oil Company of Egypt, S. A. (Standard Oil Company (N. J.) affiliate), and Anglo-Egyptian Oilfields Ltd. (Shell affiliate), were active in Egypt throughout the year. The most active leasing continued in the Gulf of Suez area, the locus of all of Egypt's commercial oil. Practically all of the wildcat and core drilling and much of the geological and geophysical exploratory work was concentrated in this region. The Mediterranean coastal belt and the broad boundaries of the Nile delta also received considerable attention and were the site of some leasing activity. No major change of emphasis is anticipated for the coming year. The presence of uncleared mine fields remains a major obstacle to field work in a large area of the Northwestern Desert.

Geological parties were active in the Gulf of Suez and Western Desert provinces. Land and water gravity-meter and magnetometer parties were working in the Gulf of Suez area, and land gravity meter work was carried out in the Western Desert. Seismic parties operated in the Gulf of Suez, Sinai Peninsula, and the Western Desert throughout the year. A break-down of the exploration by party months is shown as follows.

APPROXIMATE NUMBER OF EXPLORATION PARTY MONTHS

Geological field parties	65
Land gravity meter	24
Underwater gravity meter	4
Magnetometer	4
Seismograph	28
Core drill	20

Of the seismograph work, 11 months represent a cooperative venture for the joint account of the three companies by the Seismograph Service Corporation of Tulsa, and 12 months cover a contract service for S.V.O.C. by the Rogers-Ray, Inc. of Houston. The remainder applies to a Carter crew working for S.O.E. Most of the work done was reflection shooting, but in a few areas a certain amount of refraction shooting was done by the Seiscor crew, which was classed as an experimental party.

TURKEY

Reports indicate that geophysical work, both gravimetric and seismic, were being actively prosecuted by the Turkish Government in the Adana basin at the northeast corner of the Mediterranean. By the end of the year, the Turkish parties were supplemented by crews of the United Geophysical Company. From

the Adana area, the parties will move south to the Sanjak of Alexandretta.

There is nothing new to report in connection with drilling operations, other than that 8 of 11 new Failing rigs had been shipped by October, and that contract drilling was being carried out for the Government by the Exploration Drilling Company (J. E. Brantly) in the region of Mardin.

During the year, an economic survey of the country was undertaken by Max W. Thornburg. It will probably depend on the findings of this survey whether the Turkish Government will decide to throw open the country to foreign companies, or continue, as at present, on a national basis.

On March 3, 1948, a news item from Istanbul reported the discovery of a new oil field in the Tigris River Valley near Diyarbakir in southeast Turkey. It is too early to say whether the discovery is of importance or not.

COUNTRIES UNDER CONCESSION TO IRAQ PETROLEUM COMPANY, LTD. AND ASSOCIATED COMPANIES

Production of oil by the associated companies was limited to the Kirkuk field in Iraq. From this very large field 4,353,000 long tons (33,579,000 barrels) of oil, an average of 92,000 barrels daily, were pumped through the existing 12-inch pipeline to the Mediterranean ports of Haifa, Palestine, and Tripoli, Lebanon. A 16-inch pipeline paralleling the south leg of the 12-inch line is now under construction and is scheduled for operation in 1948. The new line will carry an additional 100,000 barrels per day. Cumulative production from Iraq totaled about 380,420,000 barrels at the end of 1947. Most of this oil has come from the Kirkuk field, but the Naft Khaneh-Naft-i-Shah (Anglo-Iranian)field on the Iranian border has produced a cumulative of about 36 million barrels, about 27 million of which has come from Naft Khaneh in Iraq, and the balance from the Naft-i-Shah portion of the field in Iran. The daily output of Naft Khaneh in Iraq was about 7,000 barrels daily in 1947. The heavy-oil field at Qaiyarah on the west side of the Tigris in the Mosul area of Iraq produced a small amount of heavy oil and asphalt for Government use, but the field is not in commercial production.

Geological and geophysical activity, estimated in party months, was as follows.

	Geological	*Geophysical*		
		Seismic	*Gravity*	*Magnetic*
Iraq	36	7	7	7
Syria	36		4	4
Lebanon	12		3	3
Palestine	24			
Transjordan	24		3	3
Cyprus		4		
Trucial Oman			16	16
Qatar	12	6	2	2
Hadhramaut	3			

The number of wells completed during the year and drilling at the close of 1947 were as follows.

	Wells Completed		Wells Drilling (All Exploration)
	Exploration	Exploitation	
Iraq	5	4	4
Qatar	0	0	1
Syria	0	0	2
Palestine	0	0	1
Lebanon	0	0	1

Two development rigs were in operation on Kirkuk throughout the year. Further details on exploration activities are here summarized.

Iraq.—The major activities in exploration embraced seismic, gravity, and magnetic surveys in southern Iraq. Confirmation of gravity anomalies by the seismograph led to making drilling locations, two of which were prepared in the Basrah area of southern Iraq, for drilling early in 1948.

In northern Iraq extensive stratigraphic studies were carried out in an effort to interpret basinal conditions within the Persian Gulf geosynclinal province.

Syria.—Surface geology, stratigraphic studies, and geophysical surveys culminated in locating two exploratory wells. These were started during the year. One of these at Baflioun, north of Aleppo was drilling at 4,700 feet at the close of the year, and the other, at Dolaa in the Palmyra basin, was drilling at 1,700 feet.

Lebanon.—One well was started and continued drilling at 4,300 feet at the end of the year. This well is located on a surface structure just north of the coastal city of Tripoli.

Palestine.—A well was started near Gaza in the southern coastal plain, on a buried structure which was outlined with the gravimeter and confirmed with the seismograph. This well was drilling at 2,400 feet at the end of the year.

A second well, located on a surface structure south of the Dead Sea, was under preparation for drilling at the end of the year.

Cyprus.—A seismic survey, following extensive surface and gravity exploration was conducted in the Mesoria plain in the central part of Cyprus.

Transjordan.—A concession covering the whole country was secured. Geological and geophysical surveys were inaugurated during the year.

Trucial Coast.—Gravimetric and magnetic surveys were carried out in the Trucial Coast sheikdoms, south of the Persian Gulf and west of the Oman Mountain range.

Hadhramaut.—Muscat, Oman, and Dhofar—A geological expedition was commenced in the Hadhramaut late in 1947, and is planned to be carried eastward into Dhofar.

Qatar.—Geological exploration, a geophysical survey embracing seismic, gravitational and magnetic methods, an aerial survey, and the commencement of a drilling program were all carried out during 1947.

It is planned to bring the Dukhan field on the Qatar Peninsula into production and export status as early as pipeline and terminal facilities can be installed. Two producers had been completed on this long structure prior to the war, and

well No. 4, already listed as drilling at the close of the year, has since been completed as a producer.

At the Anglo-Iranian field of Naft Khaneh a total of 3,921 feet were drilled on two wells completed during the year. One of these was completed as a producer and the other as a gas-oil observation well. One well was drilling at the end of 1947. The concession covering this field antedates that of the Iraq Petroleum Company over most of Iraq and is, of course, not included in the I.P.C. concession.

SAUDI ARABIA

The past year has been one of great activity for the Arabian American Oil Company, and also one of continually increasing production.

Total crude oil production by fields during 1947 was as follows.

Field	*Total Production (Barrels)*	*Average Daily*
Dammam	34,816,451	95,400
Abqaiq	53,659,716	147,000
Qatif	1,375,479	3,770
Total	89,851,646	246,170

Cumulative production to date amounts to over 202 million barrels.

Average daily rates and number of wells producing by fields for December, 1946, and December, 1947, were as follows.

Field	*Producing Wells Dec., 1946*	*Daily Production Dec., 1946*	*Producing Wells Dec., 1947*	*Daily Production Dec., 1947*
Dammam	31*	98,656	32	97,669
Abqaiq	8	82,966	18	197,271
Qatif	1	3,381	1	4,839
Total	40	185,003	51	299,779

* Does not include one gas well.

The cumulative number of wells drilled to December 31, 1947, were as follows.

	Oil Wells	*Gas Wells*	*Dry Holes*	*Abandoned*
a. (1) Dammam	33	1	3	1
(2) Abqaiq	25	—	1*	—
(3) Qatif	1	—	—	1
(4) Abu Hadriya	1	—	1**	—
(5) Buqqa	3	—	—	—
b. Wildcats	—	—	3	—
Total	63	1	8	2

* Completed as edgewater operation well.
** Drilling suspended.

The total footage drilled during 1947 amounted to 166,963 feet.

Seven rigs were in operation at the end of the year. One of the three wells drilled at Buqqa was the discovery well for that field. However, developments

during the latter part of 1947 indicate that the Buqqa area may be an extension of the Abqaiq field rather than a separate structure.

Proved reserves of Saudi Arabia are now estimated at 6 billion barrels.

Active geological and geophysical exploration work was carried on during the year. The number of party or crew months was approximately as follows: surface geologic mapping, 16; structure drilling with two drills, 13; gravity meter, 2; triangulation, 2. Seismograph work was scheduled to be resumed about the first of 1948, by use of an experimental seismograph.

The rapid growth of facilities, including housing, stabilization, power plants, and pipelines, was another feature of the year's program. Construction has started at the Arabian end on the 30–31-inch pipeline from Ras Tanura to the Mediterranean. As stated last year, this line will cut the 3,100- to 3,300-mile tanker haul around Arabia and through the Suez Canal to about one-third that distance.

BAHREIN

During 1947, the Bahrein Petroleum Company produced approximately 9,411,000 barrels (25,800 barrels daily) of crude, bringing the cumulative total for the island up to about 88 million barrels. Eleven new wells were completed during the year, bringing the number of producing wells to 68.

The company was actively engaged in prosecuting its search for additional reserves by carrying on geophysical work and structure drilling on the Hawar Islands at the south and in the surrounding shallow-water areas.

KUWAIT

Drilling operations by the Kuwait Oil Company were confined to its Burgan field in which, during 1947, 5 new flowing wells (Nos. 10, 11, 12, 15, and 16) were completed. Production for the year amounted to 16,227,093 barrels, an average daily rate of 44,500 barrels. Cumulative output for the concession now amounts to 22,174,000 barrels.

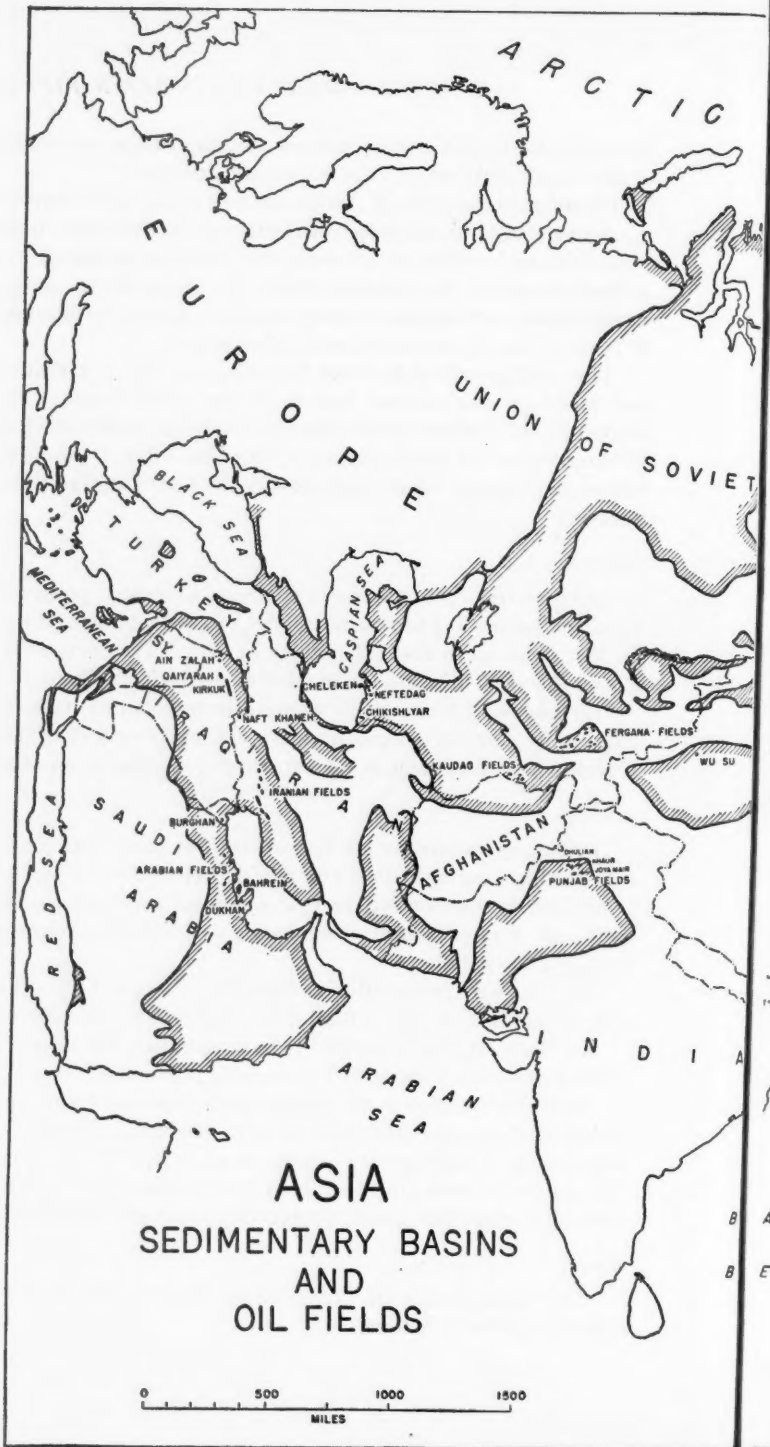
Five rigs were in operation at the end of the year, by which date also 13 wells were on production with a total daily output of 62,000 barrels.

Additional rigs are scheduled to be in operation during 1948 and an intensified drilling campaign is envisaged to increase production.

Present production in the Burgan field comes from three principal sand zones of Middle Cretaceous age (equivalent to the Wasia of Saudi Arabia) with a total depth range in existing wells of 3,672 to 4,750 feet. Oil gravities are 30–35° A.P.I. The early wells were drilled on about a 2-mile spacing, but present drilling is being done on a triangular spacing grid, giving about 600 acres drainage area per well.

IRAN

The Anglo-Iranian Oil Company production by fields for the years 1946 and 1947 was given as follows.



ASIA

SEDIMENTARY BASINS AND OIL FIELDS

FIG.

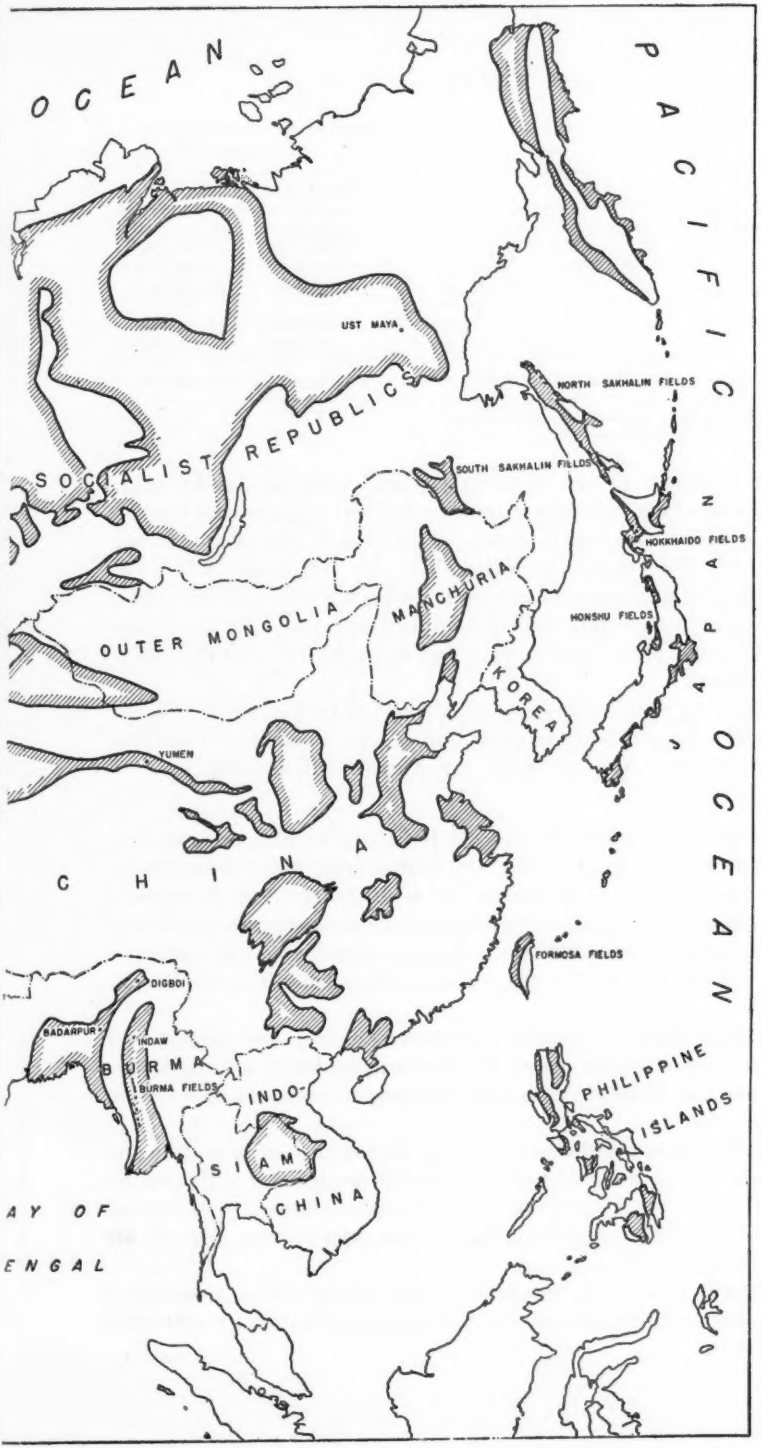

OCEAN
PACIFIC
UST MAYA
NORTH SAKHALIN FIELDS
SOCIALIST REPUBLIC
SOUTH SAKHALIN FIELDS
HOKKHAIDO FIELDS
MANCHURIA
OUTER MONGOLIA
HONSHU FIELDS
JAPAN
KOREA
YUMEN
OCEAN
CHINA
FORMOSA FIELDS
DIGBOI
BADARPUR
INDAW
BURMA
BURMA FIELDS
INDO-
PHILIPPINE
ISLANDS
SIAM
CHINA
BAY OF
BENGAL

FIG. 12

	1946		1947[a]	
	Long Tons	*Barrels*	*Long Tons*	*Barrels*
Masjid-i-Sulaiman[b]	3,674,797	28,356,300	2,684,000	21,170,000
Haft Kel	8,750,448	67,585,300	8,887,000	68,620,000
Naft Safid	699,389	5,298,900	652,000	4,940,000
Agha Jari	4,065,739	30,668,300	6,021,000	45,490,000
Pazanun[c]	27,370	242,800	—	—
Gach Saran	1,879,096	13,983,000	1,761,000	13,090,000
Naft-i-Shah[b]	92,712	754,100	130,000	1,050,000
	19,189,551	146,888,700	20,135,000	154,360,000

[a] Actual to end October—estimated for November and December.
[b] Net production, i.e., excluding recycled products.
[c] Condensate production.

This gives an average daily rate of about 423,000 barrels per day for 1947. Cumulative production from Iran to date amounts to about 1,742,000,000 barrels.

There were no new developments of note in the field of Masjid-i-Sulaiman, Haft Kel, Pazanun, Gach Saran, or Naft-i-Shah. At Naft Safid (White Oil Springs), one additional producer was brought in during the year and the drilling of the field continues. At Agha Jari, drilling continued throughout the year, three new producers being completed, and an extension of the field toward the northwest has been proved.

The most interesting news comes from the new field at Lali, in which evidence of commercial production was found in 1946. During 1947, an additional well was completed, which tested 28,000 barrels per day. Further drilling continues.

INDIA

With the separation of Pakistan from old India, the number of producing fields in present India is reduced to one, the Digboi field, which is located in eastern Assam, northeastern India. Operations at Digboi proceeded normally with an output of approximately 5,100 barrels daily. Total cumulative production for India and Pakistan is approximately 51 million barrels, about 41 million of which came from the Digboi field, and nearly all of the balance from the Punjab fields of Pakistan.

Geological and geophysical exploration has been continued since the war, and preparations have been made for new exploratory drilling; but so far drilling has started in only one area where, to date, no indications of commercial production have been found.

Prior to 1942 Burma supplied about half of India's imports of petroleum and products, on which the country has to depend for the greater part of its requirements of 10–15 million barrels annually. Other supplies came from Indonesia. With the shutting-off of production in both these supply areas, imports are largely coming from Iran.

The Government of India is reported to have established a Geophysical Planning Committee with the objective of increasing exploration for petroleum and other minerals.

PAKISTAN

The green-oil production in the principal Punjab fields of Khaur and Dhulian has continued to decrease over 1947. Some production was also obtained from the more recently discovered asphaltic oil fields of Joya Mair and Balkassar. Production in 1947, all by the Attock Oil Company, from the four Punjab fields, is estimated at 1,100 barrels daily. Of a total cumulative of about 51 million barrels for pre-partition India, approximately 10 million corresponds with Pakistan, nearly all of which was produced from the Punjab fields.

Prospecting in the western or main area of Pakistan has continued rather actively. The Burmah Oil Company have had two seismic parties in the Indus Valley, and a United Geophysical crew is reported to be operating in the Punjab for Shell. Geological work has been going on both in the western and eastern areas of the Dominion of Pakistan in 1947.

The Burmah and Attock Oil companies have continued exploratory drilling. The latter company is greatly interested in determining the productive area of its Balkassar field, discovered in June, 1946, at a depth of 8,200 feet in the upper part of the Eocene Nummulitic limestones. Well No. 3, which has proved an eastern extension of the field, is a 300-barrel per day well. A fourth well has been spudded. Though asphaltic, the Balkassar oil is less heavy than that of Joya Mair, where three wells had been completed at last report. Both Joya Mair Nos. 1 and 2 were reported to have tested about 9,000 barrels daily of heavy viscous oil. No. 3 found the Eocene limestone barren and, on drilling deeper, oil showings were reported to have been found in Carboniferous strata. With the development of a sufficient potential at Balkassar and Joya Mair, a pipeline will probably be constructed to carry the oil 35 miles northward to link with a 52-mile line which now carries oil northeastward from the Khaur and Dhulian fields to a refinery at Rawalpindi.

A limited amount of other prospect drilling has been in progress in the Punjab, and negotiations for exploration licenses in Pakistan are reported.

BURMA

Activity in 1947 was principally directed toward the rehabilitation of the oil fields. As a result of the scorched-earth policy adopted in 1942, the oil fields were put out of action and the Japanese were successful in recovering only a small proportion of the production. Reconditioning has been in progress, but new drilling had not started by the end of the year. A great deal has been done in repairing or rebuilding damaged buildings and constructing new workshops, power stations, *et cetera* in place of those totally destroyed.

As refining facilities are not yet rebuilt, production has been on a small scale. Although no precise figures are available, the production during 1947 averaged approximately 600 barrels per day, which is comparable with a pre-war production of about 22,000 barrels daily. Cumulative production is approximately 283 million barrels.

OCEANIA

SEDIMENTARY BASINS AND OIL FIEL

FIG.

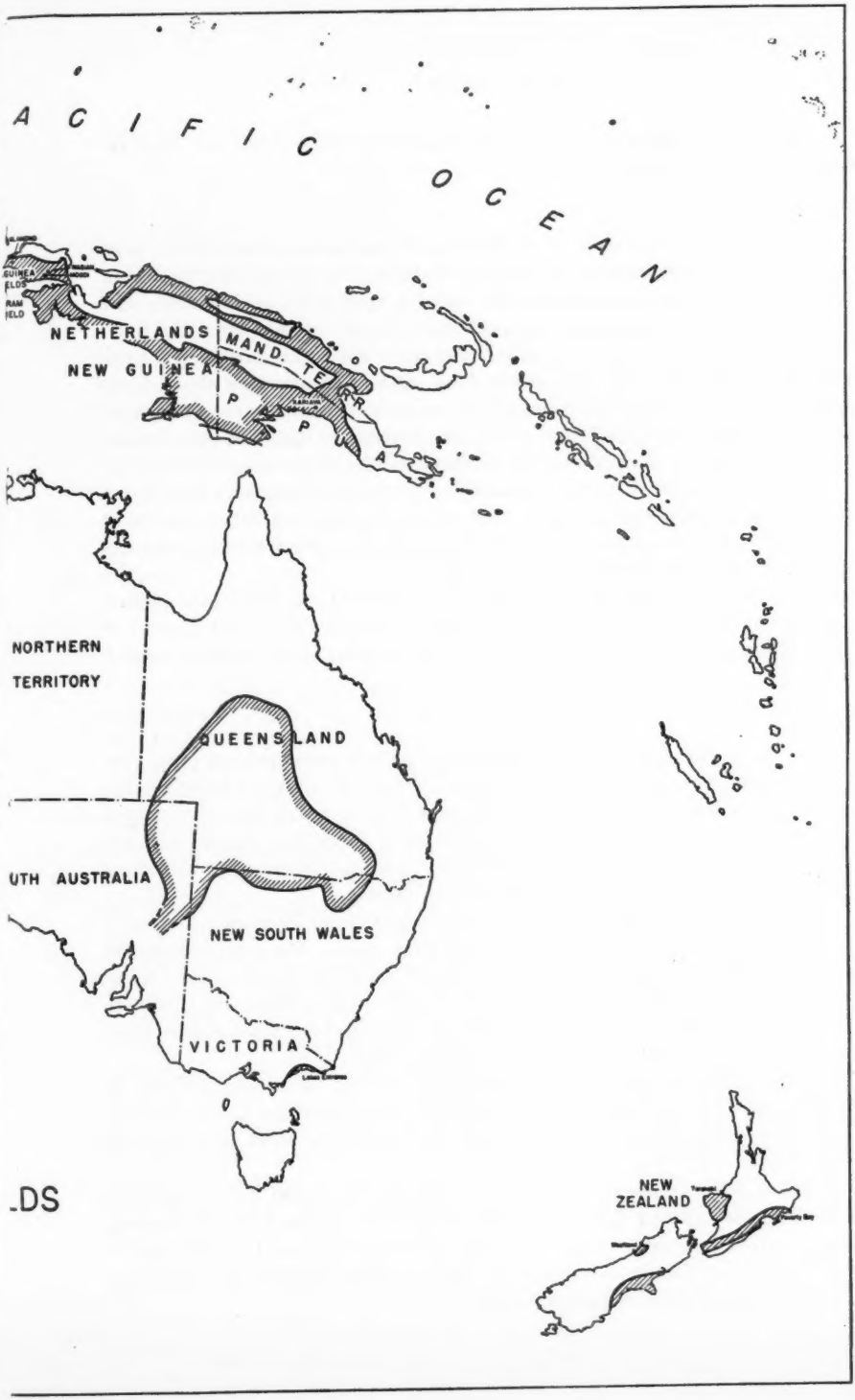

PACIFIC OCEAN
NETHERLANDS
NEW GUINEA
NORTHERN
TERRITORY
QUEENSLAND
NEW SOUTH WALES
VICTORIA
NEW
ZEALAND

FIG. 13

Geological and geophysical work and exploratory drilling had not been resumed at the end of 1947.

CHINA

Cumulative oil production is now about 3,287,000 barrels. Outside of a very small amount of production on the Island of Formosa, the only producing field in China is at Yumen or Laochunmiao, discovered in 1939 in the northwestern part of the Province of Kansu in the remote region of west central China. By June, 1947, a total of 24 wells had been drilled and three more were projected for the remainder of the year. At the present time production averages about 1,000 barrels of 33° A.P.I. oil a day coming from 10–12 wells actually on production. The initial production varied from 50 to 2,000 barrels per day. The oil is refined locally and is used in the surrounding territory chiefly by the army.

The small operation in Kansu is handled by the Kansu Petroleum Production and Refining Administration. This as well as prospecting and other operations in other areas of China are all under the management of the Chinese Petroleum Corporation, Ltd., established in May, 1946.

For the rest of China there is nothing of importance to add to the picture shown on the map and in the account given a year ago. A limited amount of geologic exploration was done during the year on the part of the Chinese Government.

JAPAN

Little has developed in Japan to change the picture presented last year. Production during the year is reported to have averaged about 3,560 barrels daily, a moderate decrease from 1946. Cumulative production totals about 91,502,000 barrels. The drain of war, labor unrest, and financial difficulties, coupled with the small proved reserve, variously estimated at 15–20 million barrels, and the failure to find important new reserves account for the decline.

The three best areas of production, Akita, Nigata, and Yamagata basins, lie on the western side of northern Honshu, the main island. The total prospective area of these three basins probably is not more than 8,000 square miles. The so-called central Hokkaido basin, extending from south-central Hokkaido (northern island) northward along the west coast, has an area of about 6,000 square miles in which there are a number of small producing fields.

As reported last year, production in Japan is from the Upper Tertiary in foothill folds. There has been very little or no exploration of the Lower Tertiary and Cretaceous formations, nor have all present producing zones been tested in various fields.

Before the war, indigenous production supplied less than 15% of Japan's needs. Plans are reported to be under way, under General MacArthur's program, to teach latest exploration and producing techniques to the Japanese and to apply modern methods in an attempt to supply a larger proportion of the country's requirements from indigenous crude.

PHILIPPINES

The only drilling activity during the year was that of a single well in northern Cebu completed by the Far East Oil Development Company at a depth of 9,934 feet, bottomed in basement rocks. Various showings of oil are said to have been encountered below the depth of 8,000 feet.

EAST INDIES

All figures given here are our best estimates. They are derived from conflicting data in some cases, and are subject to revision.

Cumulative production at the end of the year 1947 in the East Indies totals 1,241,774,000 barrels, of which 1,109,387,000 barrels were secured in the Netherlands East Indies and 132,387,000 barrels in British Borneo and Sarawak. These figures include an estimated amount of 102 million barrels produced by the Japanese during the war.

Prior to the Japanese invasion, daily production was approximately 180,000 barrels a day, some 165,000 barrels of which came from the Netherlands East Indies. At the end of the war, production had declined to almost zero, but began to increase as rehabilitation first got under way in British and Dutch Borneo.

Production in British Borneo now exceeds the pre-war rate of 19,000 barrels a day. It averaged 36,000 barrels daily in 1947 and early in 1948 was reported to have reached about 50,000 barrels daily. Much of this large increase in production is from the Seria field, where prolific light-oil production has been found at depth below a shallow zone of heavy oil.

In Dutch Borneo, rehabilitation of fields in the Tarakan and Balikpapan areas, which started soon after the Japanese were driven out, proceeded somewhat more slowly than in British Borneo, but by the end of 1947, production exceeded 5,000 barrels a day in the Tarakan fields and was somewhat more in the Sanga-Sanga and Sambodja fields. The refinery at Balikpapan has been partially, but not wholly restored. A total daily yield of about 13,000 barrels daily at the end of 1947 is comparable with about 36,000 barrels per day prior to the war.

The oil fields of northern and central Sumatra have not been re-entered to date. Those in Djambi and the northern part of the Residency of Palembang likewise remain inaccessible. On the other hand, the prolific producing area, west of the city of Palembang, was re-entered in August, 1947. Here, the Shell Oil Company's fields of Talang Djimar, Goenoeng Kemala, Liman, and Soeban Djerigi, and the Standard-Vacuum fields of Talang Akar-Pendopo, Djirak, and Benakat, are now accessible. Restoration of this region has been rapid. By the end of the year production in this area amounted to 50,000 barrels a day, and by the end of 1948 should exceed 80,000 barrels daily. This is comparable with a pre-war output for all of Sumatra amounting to about 115,000 barrels daily in 1939.

In Java the main oil fields and refinery at Tjepoe are still inaccessible. The small Kroeka field on the outskirts of the city of Soerabaya has been re-entered

and restored to a daily production of approximately its pre-war status of 1,200 barrels a day, and the adjacent refinery at Monokromo, with a capacity of about 2,000 barrels a day, has been rebuilt. Pre-war production in Java was about 17,000 barrels daily.

In New Guinea, the Klamono, Wasian, and Mogoi fields have been re-entered and are being prepared for their first commercial production by the Nederlandsche Nieuw Guinee Petroleum Maatschappij, a company owned 40% by the Standard Oil Company (New Jersey) and Socony-Vacuum Oil Company, through the Standard-Vacuum Oil Company, 40% by Royal Dutch Shell interests through the Bataafsche Petroleum Maatschappij, and 20% by The Texas Company and Standard of California through the Nederlandsche Pacific Petroleum Maatschappij. Exploration drilling has been started in the region north of the Klamono field and geological and geophysical work is in progress. Headquarters for this operation is at Sorong on the northwestern tip of the Vogelkop area of New Guinea.

No rehabilitation work has yet started on the Island of Ceram, whose pre-war output was only about 2,000 barrels daily.

Very little geological work, other than checking on records after the war, was done in Netherlands East Indies. Likewise, there was no geophysical work, but gravity-meter and seismograph study has begun, or shortly will get under way in New Guinea.

At this point it is of interest to note the relation of production to consumption demands in the Far East to-day as compared with the immediate pre-war period. Total crude-oil production of about 125,000 barrels per day in early 1948 in the entire Far East (including Indonesia and Asia east of the Middle East and excluding Russian areas) was about 58% of the immediately pre-war production of around 215,000 barrels daily. Eighty-three per cent of this pre-war total was supplied by Indonesia. Meanwhile consumption demand is said to be approximately 425,000 barrels daily or 35% above the 315,000 barrels daily prior to the war. This left a deficiency in local production at the opening of 1948 of about 300,000 barrels daily. Part of the deficiency will be made up in 1948 and, no doubt, much more will be taken care of as operations in old fields and exploration for new reserves are fully resumed.

AUSTRALIA

In Continental Australia, exploration by the Shell Oil Company continued in the Great Artesian Basin of Queensland and preparations were being made to drill a deep test near Rolleston in central Queensland. A prospecting company, owned equally by the D'Arcy Exploration (Anglo-Iranian), Vacuum Oil and the Australian Zinc Corporation was active in the Frome-Broken Hill region of central Australia and in the Desert Basin of northwestern Australia.

In Papua (southeastern or Australian part of the Island of New Guinea),

the Australasian Petroleum Company, Pty., Ltd. (80% of capital held by the D'Arcy Exploration Company, Ltd. and the Vacuum Oil Company and most of the balance by Oil Search Ltd.) resumed drilling at Kariava, northwest of Port Moresby, late in 1946 and carried this well to a depth of 11,219 feet by December 31, 1947. Commercial production has not been reported to date. The Australasian Petroleum Company was also carrying on geological and geophysical work in Papua and in the Mandated Territory of New Guinea (northeastern New Guinea).

WORLDWIDE GEOPHYSICAL ACTIVITY IN 1947 IN CREW MONTHS*

Country	*Seismic*	*Gravity*	*Magnetometer*	*Electrical Prospecting*
Alaska	11	4.5	—	—
Canada	149	43	7	—
United States	4,777	1,513	180	?
Mexico	106	39	—	12
Nicaragua	12	—	—	—
Bahamas	8	47	10	—
Cuba	8	16	3	—
Trinidad	?	?	—	—
Venezuela	321.25	159.25	9	—
Colombia	133	72	5	—
Peru	2.5	29	29	—
Chile	8	4	—	—
Argentina	80 ?	40 ?	—	—
Paraguay	24	—	—	—
Brazil	24	—	—	—
England	12 ?	—	—	—
Netherlands	15 ?	20 ?	—	—
France	?	?	—	?
Germany	30 ?	—	—	—
Denmark	12	12	—	—
Austria	12 ?	—	—	—
Hungary	—	9	—	—
Roumania	10 ?	20 ?	—	—
Italy	22	12	—	—
Russia	?	?	?	?
Egypt	28	28	4	—
Morocco	?	?	—	?
Tunisia	—	12	—	6
Turkey	?	?	—	—
Iraq	7	7	7	—
Syria	—	4	4	—
Lebanon	—	3	3	—
Transjordan	—	3	3	—
Cyprus	4	—	—	—
Trucial Oman	—	16	16	—
Qatar	6	2	2	—
Arabia	—	—	—	—
Iran	?	—	—	—
India	20 ?	—	—	—
Papua	—	12	12	—
Australia	—	18	18	—

* For most of the countries, the figures are actual. In a few cases, they are estimated or guessed. In those cases marked only with a ? there is good reason to believe that crews operated, but sufficient information is not available to hazard a guess at the extent of activity.

WORLD CRUDE-OIL PRODUCTION (BARRELS 42's)
(Partly estimated)

	Cumulative through 1947	*Daily Average*	
		1939	*1947*
United States	35,080,677,000	3,465,649	5,082,000
Canada	123,561,000	20,664	21,000
Cuba	580,000	—	700
Mexico	2,311,147,000	117,203	154,000
Other North America	406,000	—	—
Total North America	37,516,371,000	3,603,516	5,257,700
Venezuela	4,046,554,000	562,829	1,190,800
Colombia	413,176,000	64,835	68,400
Trinidad	348,798,000	53,541	55,700
Argentina	385,620,000	50,999	59,900
Bolivia	3,950,000	589	1,300
Brazil	386,000	—	265
Ecuador	41,800,000	6,461	6,300
Peru	356,129,000	37,007	35,000
Total South America	5,596,413,000	776,261	1,417,665
Total West. Hemis. except U. S.	8,032,107,000	914,128	1,593,365
Total Western Hemisphere	43,112,784,000	4,379,777	6,675,365
Albania	9,578,000	3,027	1,000
Austria	47,180,000	2,580	16,660
Czechoslovakia	4,082,000	325	500
France	14,398,000	1,370	1,000
Germany	88,060,000	12,823	11,500
Great Britain	3,850,000	88	950
Hungary	38,995,000	3,069	11,900
Italy	3,326,000	241	250
Netherlands	1,968,000	—	4,050
Poland*	268,382,000	9,058†	2,600‡
Roumania	1,172,445,000	127,141	78,000
Yugoslavia	2,739,000	—	1,000
Total Europe except Russia	1,655,003,000	159,722	129,410
Egypt	106,759,000	12,796	25,500
Iraq	380,420,000	82,079	99,000
Iran	1,742,006,000	202,611	423,000
Bahrein	88,023,000	20,791	25,800
Arabia	202,129,000	10,778	246,200
Qatar	26,000	—	—
Kuwait	22,174,000	—	44,500
Other Africa	557,000	—	—
Total Near and Middle East	2,542,094,000	329,055	864,000
Burma	282,789,000	21,570	600
China	3,287,000	—	1,000
India	52,304,000	6,375	6,200
Japan	91,502,000	6,471	3,600
Total South and East Asia	429,882,000	34,416	11,400
British Borneo	132,387,000	19,383	36,000
Netherlands East Indies	1,109,387,000	160,554	20,000
Total Oceania	1,241,774,000	179,937	56,000
Total East. Hemis. except Russia	5,868,753,000	703,130	1,060,810
Total Foreign except Russia	13,900,860,000	1,617,258	2,654,175
Russia* and Sakhalin	5,783,901,000	611,319	525,000
Total Foreign	19,684,761,000	2,228,577	3,179,175
Total World	54,765,438,000	5,694,226	8,261,175

* Eastern Poland included with Russia commencing 1941.
† Pre-war territories.
‡ Western Poland only.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 32, NO. 6 (JUNE, 1948), PP. 1161-1210, 5 FIGS., 9 TABLES

THE ASSOCIATION ROUND TABLE

THIRTY-THIRD ANNUAL MEETING, DENVER, APRIL 26–29, 1948

ADDRESS OF WELCOME[1]

C. E. MANION[2]
Denver, Colorado

Geologists, paleontologists, mineralogists, geophysicists, your wives and friends, "good morning," and it is a beautiful morning. On behalf of the Rocky Mountain Association Geologists, I welcome you to the mile-high city of the Rocky Mountains. I hope you all enjoyed a good night's sleep in your various hotels and motels, such as can be had only in this invigorating mountain air.

Never before in the history of this convention has such an array of exploratory brains and brawn, and as I look around, feminine beauty, been gathered to discuss their problems and renew old friendships. We, as your hosts, are highly pleased at your response to this meeting. Last year at Los Angeles when we invited you to Denver we hardly expected the entire membership of all the societies to accept our invitation; nevertheless, we are very happy that you are here, and to say you have overwhelmed us is an understatement; you almost swamped our boat. Six years ago this month 900 members of the three societies were registered at the annual meeting here, and at that time Denver had a population of 322,000. At this convention are registered 3000 members and their wives and Denver has grown to a city of more than 500,000 souls with no new hotels to accommodate our guests. We want you to know that the hotels and housing committee has done everything in its power to secure adequate accommodations for you and it has been a colossal job; but knowing you people as I do, and I have roughed it with many of you, I am sure you will bear with us and we will try to make up in hospitality what we may lack in accommodations.

I realize that you people like to come to Colorado and I believe I know why most of you like it here. For instance, you Easterners, those of you who live east of Kansas City, like to come here to cool off and get the smog out of your eyes, and to enjoy a little western atmosphere. Kansans, Nebraskans, and Oklahomans come here mainly in the summer and fall to enjoy our hunting and fishing and camping in the mountains. Those of you from California gaze with envy on our snow-covered peaks and come here hoping to get more Colorado River water for your vast desert. I can understand all this, but I was not able to understand why so many Texans leave Texas, which they say has everything desirable to the human race. Pondering this paradox, I went back into the history of Texas and have come up with what I believe is the answer. Prior to 1850, the State of Texas owned all of eastern New Mexico, including the eastern New Mexico oil fields, the Panhandle of Oklahoma, southwestern Kansas, including the Hugoton gas field, all of the land in Colorado south of the Arkansas River, and a strip of land lying along the Continental divide some 60 miles wide, extending to Rawlins, Wyoming. In 1850 the State of Texas sold this vast, scenic domain, full of trout streams, wild game, ranch lands, and oil and gas fields, to the United States for the huge sum of $10,000,000. In recent years when the people of the State of Texas roamed far enough away from their homes to find out what they had sold, they immediately began buying it back, ranch by ranch, resort by resort, stream by stream. The plan is one of infiltration, with the idea of eventually taking the lost

[1] At the joint session of A.A.P.G., S.E.P.M., and S.E.G., Shirley-Savoy Hotel, April 27, 1948.

[2] President, Rocky Mountain Association of Geologists.

lands back into the State of Texas. And now comes a contingent from Texas, 350 strong in a special train, and I ask you citizens of Colorado to keep a watchful eye on the activities of these poachers or we will end up after this convention without a state.

Now that we know why you are all here, I hope you make this meeting one to be remembered. Enjoy your old friends, the excellent papers you will hear, and I hope you will enjoy the entertainment provided for you. It is my wish that you all go home filled with new ideas and a determination to spend every summer vacation in Colorado. Thank you.

PROGRAM OF PAPERS

Monday Night

1. Address of Welcome
   Honorable W. Lee Knous, Governor of Colorado
2. Mexican Oil
   Senator Antonio J. Bermudez, Director Petroleos Mexicanos, Mexico, D. F.
3. Synthetic Oil and Gas in the United States with Particular Reference to Western Coals
   V. F. Parry, Supervising Engineer, U. S. Bureau of Mines, Golden, Colorado

Tuesday Morning—Joint Session, A.A.P.G., S.E.P.M., S.E.G.

1. Address of Welcome
   C. E. Manion, President, Rocky Mountain Association of Geologists
2. Stratigraphy and Paleogeography of Catahoula-Frio Formation
   James A. Waters, President, S.E.P.M.
3. Integration in Exploration
   Cecil H. Green, President, S.E.G.
4. Social Trends in Science
   Carroll E. Dobbin, President, A.A.P.G.
5. Presentation of Awards, and Responses

Tuesday Afternoon

1. Statistics of Exploratory Drilling, 1947
   Frederic H. Lahee, Geological and Research Counselor, Sun Oil Company, Dallas, Texas
2. The Occurrence of Oil in the Arbuckle and Ellenburger Formations of the Mid-Continent Area
   John G. Bartram, Edward F. Shea, and William C. Imbt, Stanolind Oil and Gas Company, Tulsa, Oklahoma, and Midland, Texas
3. The Golden Trend of McClain and Garvin Counties, Oklahoma
   Robert M. Swesnik, Geologist, Anderson-Prichard Oil Company, Oklahoma City, Oklahoma
4. Leduc Oil Field, Alberta, A Devonian Coral-Reef Discovery
   D. B. Layer, Research Geologist, and members of staff, Imperial Oil Limited, Calgary, Alberta, Canada

Tuesday Night

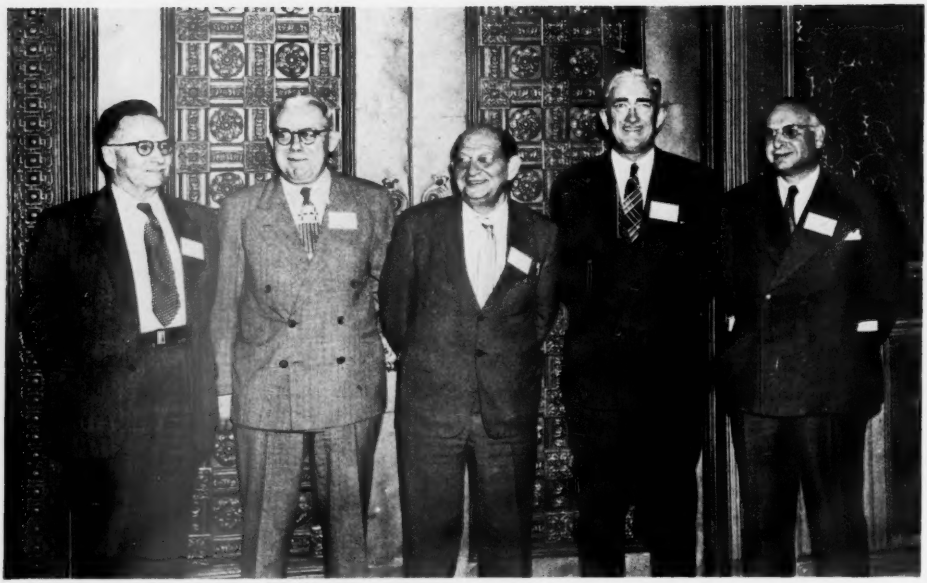
1. Oil in the Middle East and Film Showing Life in the Middle East
   James Terry Duce, Vice President, and Max Steineke, Chief Geologist, Arabian American Oil Company, San Francisco, California

Wednesday Morning—Rocky Mountain Region

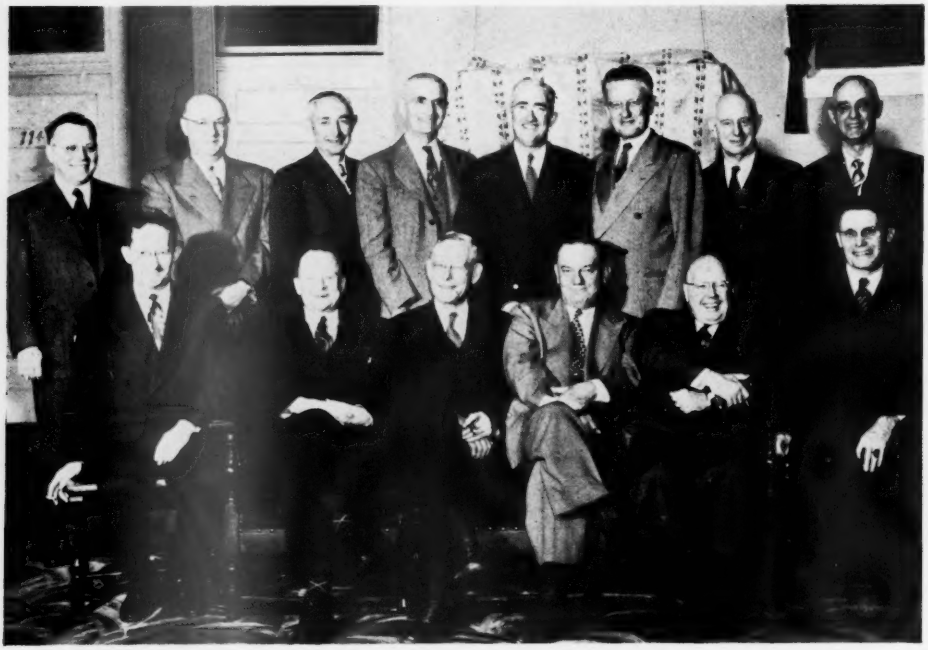
1. Certain Relationships Between Geology and the Production Pattern in the Rocky Mountains
   Max L. Krueger, Chief Geologist, and Penn L. Gooldy, Assistant Geologist, Rocky Mountain Division, Union Oil Company of California, Laramie, Wyoming
2. Orogeny of the Rockies
   C. J. Hares, Research Geologist, retired, The Ohio Oil Company, Boulder, Colorado
3. Mesozoic and Late Paleozoic History of Colorado and Adjacent Areas
   Ross L. Heaton, U. S. Bureau of Reclamation, Denver, Colorado
4. Regional Stratigraphy and Structure of Wyoming
   H. D. Thomas, Professor of Geology, University of Wyoming, State Geologist of Wyoming, Laramie

PAUL WEAVER

President of the Association. Geophysicist of the Gulf Oil Corporation, Houston, Texas.



New A.A.P.G. executive committee. Left to right: editor CLARENCE L. MOODY, Ohio Oil Company, Shreveport, Louisiana; secretary-treasurer J. V. HOWELL, consultant, Tulsa, Oklahoma; president PAUL WEAVER, Gulf Oil Corporation, Houston, Texas; past-president C. E. DOBBIN, United States Geological Survey, Denver, Colorado; vice-president ROY M. BARNES, Continental Oil Company, Los Angeles, California.



A.A.P.G. presidents at 33d annual meeting. Left to right, seated: Ira H. Cram (1944); J. Elmer Thomas (1917); W. E. Wrather (1922); Alexander Deussen (1918); Max W. Ball (1923); Monroe G. Cheney (1945). Standing: Henry A. Ley (1939); Earl B. Noble (1946); G. C. Gester (1927); F. H. Lahee (1932); C. E. Dobbin (1947); A. I. Levorsen (1935); W. B. Heroy (1934); James H. Gardner (1924). Present at the convention but not in the picture: Fritz L. Aurin (1942); H. B. Fuqua (1937); E. DeGolyer (1925); R. S.McFarland (1928).

S.E.P.M. Officers

R. Dana Russell
President

J. B. Garrett, Jr.
Vice-President

H. B. Stenzel
Secretary-Treasurer

Rocky Mountain Association of Geologists

C. E. Manion
President

T. S. Harrison
Chm. Convention Committee

A. E. Brainerd
Co-Chairman

Western-style dinner, Lincoln Room, Shirley-Savoy Hotel, Thursday, April 29.

WEDNESDAY AFTERNOON

1. Orogenic Record of Central Utah
   Edmund M. Spieker, Chairman, Department of Geology, The Ohio State University, Columbus
2. Paleozoic Geology of the North and West Sides of the Uinta Basin, Utah
   Arthur A. Baker, John W. Huddle, and Douglas M. Kinney, United States Geological Survey
3. Tectonic Control of Paleozoic Sedimentation in the Montana Area
   L. L. Sloss, Department of Geology, Northwestern University, Evanston, Illinois
4. Geology of the Rocky Mountain Front Ranges in the Vicinity of the Bow River, Alberta
   L. M. Clark, Shell Oil Company of Canada, Limited, Calgary, Alberta, Canada

THURSDAY MORNING

1. Paleogeography of the Northern Part of the Permian Basin of West Texas and Southeastern New Mexico
   John M. Hills, Consulting Geologist, Midland, Texas
2. Paleotectonic and Paleogeologic Maps of the Central and Western Part of North America
   A. J. Eardley, Professor of Structural Geology, University of Michigan, Ann Arbor
3. Gas for the Future
   Gail F. Moulton, Staff Geologist, The Chase National Bank, New York, New York
4. Geologic Investigations in Naval Petroleum Reserve No. 4 and Adjacent Northern Alaska
   George O. Gates, Geologist, United States Geological Survey, Washington, D. C.
5. Tectonic and Sedimentary Setting of Naval Petroleum Reserve No. 4, Northern Alaska
   Thomas G. Payne, Geologist, United States Geological Survey, Washington, D. C.

THURSDAY AFTERNOON

1. Age of the Amsden Formation in Montana and Wyoming
   Harold W. Scott, Professor of Geology, University of Illinois, Urbana
2. Petroleum Supply
   Max W. Ball, Director, United States Department of the Interior, Oil and Gas Division, Washington, D. C.
3. Stratigraphic Studies in Ethiopia
   Hall Taylor, Professor of Geology, Columbia University, New York, New York
4. The Geologist in Uniform: World War II
   David M. Delo, Chief, Scientific Manpower Section, Research and Development Group, General Staff, United States Army, Washington, D. C.

MINUTES, THIRTY-THIRD ANNUAL BUSINESS MEETING DENVER, APRIL 29, 1948

CARROLL E. DOBBIN, *presiding*

The meeting was called to order at 3:45 P.M., Thursday, April 29, 1948, at the Broadway Theatre, Cosmopolitan Hotel, Denver, Colorado, by president Carroll E. Dobbin, chairman.

1. *Reading of minutes.*—It was moved, seconded, and carried that the minutes of the last annual meeting, held at Los Angeles, March 26, 1947, be not read since they have been published in the *Bulletin* (May, 1947, pp. 854–96).

2. *Report of business committee.*—The report of the business committee, Theo A. Link, chairman, was read by J. V. Howell, secretary (Exhibit I).

It was moved, seconded, and carried that the report be adopted.

3. *Reports of officers.*—The reports of president Carroll E. Dobbin, secretary-treasurer J. V. Howell, and editor C. L. Moody were read (Exhibits II, III, and IV).

4. *Report of resolutions committee.*—The report of the resolutions committee was read by W. A. Waldschmidt, chairman (Exhibit V).

It was moved, seconded, and carried that the report be accepted.

5. *Incoming officers.*—President Dobbin introduced the incoming officers: president, Paul Weaver, Houston, Texas; vice-president, Roy M. Barnes, Los Angeles, California;

Western-style dinner, Lincoln Room, Shirley-Savoy Hotel, Thursday, April 29.

secretary-treasurer, J. V. Howell, Tulsa, Oklahoma; editor, Clarence L. Moody, Shreveport, Louisiana.

6. President Dobbin, in behalf of the retiring officers, thanked the entire membership especially for cooperation and good will throughout the year.

(The following reports appear as exhibits in the minutes)

I. Business, Theo. A. Link, chairman
II. President, Carroll E. Dobbin
III. Secretary-treasurer, J. V. Howell
IV. Editor, C. L. Moody
V. Resolutions, W. A. Waldschmidt
VI. National Research Council, Philip B. King, representative
VII. Stratigraphic nomenclature, Monroe G. Cheney, chairman
VIII. Publication, Lynn K. Lee, chairman
IX. Research, Shepard W. Lowman, chairman
X. Geologic names and correlations, Henry J. Morgan, chairman
XI. Applications of geology, Kenneth K. Landes, chairman
XII. Medal award, Carroll E. Dobbin, chairman
XIII. Statistics of exploratory drilling, Frederic H. Lahee, chairman
XIV. Distinguished lectures, Fred H. Moore, chairman
XV. Boy Scouts literature, Frank Gouin, chairman
XVI. Education, Roy R. Morse, chairman

The meeting adjourned at 4:45 P.M.

CARROLL E. DOBBIN, *chairman* J. V. HOWELL, *secretary*

EXHIBIT I. REPORT OF BUSINESS COMMITTEE

The business committee recommends to the Association in annual meeting that the following proposals be adopted.

1. The executive committee recommends and the business committee approves the adoption of the articles of organization of the American Geological Institute which have been amended to permit the affiliation of the Institute with the National Research Council.

2. The business committee recommends that the reports of the standing and special committees which were read and approved in the business committee meeting be approved and published in the *Bulletin.*

THEO. A. LINK, *chairman;* BEN H. PARKER, *co-chairman;* J. V. HOWELL, *secretary*

EXHIBIT II. REPORT OF PRESIDENT

The total membership of the Association at its 33d annual meeting in Denver, Colorado, April 26–29, 1948, was about 5,584, a net increase of 491 since the annual meeting at Los Angeles, California, March 24–27, 1947; in fact, between these meetings the executive committee approved more than 800 applications for membership.

Regional meetings were held at San Antonio, Texas, November 5–8, 1947, under the sponsorship of the South Texas Section, and at St. Louis, Missouri, January 14–15, under the sponsorship of the Illinois Geological Society and the Indiana-Kentucky Geological Society. These meetings concentrated on Association interest in and the geology of the respective regions, omitting the committee meetings, conferences, and other business that feature annual meetings of the Association. Both meetings—like those at Biloxi, Mississippi, and Wichita, Kansas, during the preceding administrative year of the Association—were highly successful from the standpoint of attendance, enthusiasm, quality of

scientific contributions, social activities, and the demonstrated ability and competency of the younger members in organizing and presenting technical papers. The South Texas regional meeting at San Antonio, with a total registration of 696, featured technical sessions the first two days and field trips the last two days, emphasizing the stratigraphy, structure, and oil and gas developments of southwestern Texas. The Eastern Interior regional meeting at St. Louis, with a total registration of 475, stressed the regional geological features of the Ozarks, the Great Lakes, and the Appalachians.

The executive committee has accepted the invitation of the Pittsburgh Geological Society to hold a regional meeting of the Association at Pittsburgh, Pennsylvania, October 4–5, 1948.

Earl B. Noble, A. Rodger Denison, J. Brian Eby, J. Harlan Johnson, Glenn C. Bartle, and Walter B. Wilson were appointed delegates to represent the Association at the 18th Session, International Geological Congress in Great Britain in 1948.

William B. Heroy and Ira H. Cram—past-presidents of the Association—were appointed directors of the American Institute as representatives of the Association. They represented the Association at a constitutional meeting of the Institute at Washington, D. C., October 27, 1947, at which thirteen other national geological and related societies were represented. The executive committee approved the proposed affiliation of the Institute with the National Research Council.

Monroe G. Cheney and R. K. DeFord were appointed representatives of the Association to contribute to the section of the *Scientific Monthly*, called "Science on the March," the monthly publication of the American Association for the Advancement of Science.

C. J. Hares and I represented the Association at the Mountain-Plains regional conference of UNESCO at Denver, May 16, 1947, and I represented the Association at the annual meeting of the Geological Society of America at Ottawa, Ontario, Canada, December 29–31, 1947.

In 1947, the executive committee met at Los Angeles, March 26 and 27; Tulsa, Oklahoma, May 6; Cody, Wyoming, August 4; and San Antonio, Texas, November 4; and in 1948 at St. Louis, January 13, and at Denver, April 24–29.

During the year the Association's *Index* for 1917–1945 was published under the editorial direction of Miss Daisy Winifred Heath, who also prepared the 1917–1936 *Index*. As former editor Scott wrote in prefacing the latest *Index*, "The Index may be taken as a measure of the well-nigh incredible accomplishments of the Association in the fields of pure geology, petroleum geology, and technology." Also, Volume 3, *Structure of Typical American Oil Fields*, has just been published under the competent editorship of J. V. Howell.

The executive committee approved a recommendation of the medal award committee that the President's Award of $100 in cash be divided equally between L. L. Sloss, professor of geology at Northwestern University, and W. M. Laird, State geologist of North Dakota, for their joint article on "Devonian System in Central and Northwestern Montana," which was published in the August, 1947, *Bulletin;* it approved the unanimous recommendation of the medal award committee that the Sidney Powers Memorial Medal Award be conferred on Arville I. Levorsen, dean of the School of Mineral Sciences, Stanford University, and a former president of the Association, for his distinguished and outstanding contributions to and achievements in petroleum geology as a field geologist, executive, researcher, teacher, and counselor; and it elected Hugh D. Miser, United States Geological Survey, to honorary membership in the Association for his distinguished service to the cause of petroleum geology as chief of the Fuels Section of the Survey during the period 1927–1947 and for his published geological contributions.

Some of the many miscellaneous things acted upon by the executive committee during

the year are the following: in early December, 1947, the headquarters of the Association was moved from the Wright Building to the Chestnut-Smith Building in Tulsa; no new committees were created, and one, the special national service committee, was dissolved; funds were voted to the Colorado School of Mines to continue the *Review of Petroleum Geology*, a joint undertaking of the Association's research committee and that institution, which is published annually as an issue of the *Mines Quarterly*, with the understanding that at the Denver meeting the committee for publication and the representatives of that institution would arrange to eliminate duplication; the annual appropriation to the Society of Economic Paleontologists and Mineralogists was increased; the salaries of all women at Tulsa headquarters were increased; the membership of the research committee was increased from twenty-four to thirty, and $2,500 was allotted for its work; funds were voted to aid the committee on applications of geology in compiling a *Directory of Visual Aids* (geological films); a new investment counselor was engaged; and funds were voted to C. E. Decker, secretary-treasurer of the Association during 1919–1925, to complete special stratigraphic researches.

The Association has three regional sections, one technical division, and twenty-eight affiliated societies. During the fiscal year, I visited twenty-three of these and several non-affiliated geological societies, one of the latter being the organizational meeting of the Geological Society of New Mexico at Albuquerque, April 12, 1947.

The following, among many others, deserve especial thanks for efficient and friendly counsel and cooperation during my administration: the executive committee, the United States Geological Survey, committee chairmen, sponsors of regional meetings, host societies on presidential visits, J. P. D. Hull, business manager of the Association since 1926, and the Rocky Mountain Association of Geologists, which sponsored the 33d annual meeting at Denver under very difficult conditions.

CARROLL E. DOBBIN, *president*

EXHIBIT III. REPORT OF SECRETARY-TREASURER
(Year ending March 1, 1948)

The past year has seen the greatest actual, if not also greatest percentage growth in Association history. Total membership increased from 5039 on March 1, 1947 to 5530 on March 1, 1948, or a net gain of 491 members. This growth, shown graphically on the chart (Fig. 1) and Table I, has continued since 1935, and has shown a somewhat accelerated rate during each of the past three years. There is no evidence that the rate will be materially changed during the coming year, for the increase during March was 54 and 80 applications are ready for signatures of the Executive Committee, so that an equal or greater rate of increase is probable during the coming year.

On the debit side of our membership ledger we regret to report the loss by death of 15 members. They are as follows:

MEMBERS AND ASSOCIATES DECEASED

Honorary

Darton, Nelson H., February 28, 1948

Active

Abernathy, George E., February 6, 1948
Bohdanowicz, Charles, June 7, 1947
Born, Kendall E., September 21, 1947
Hasbrouck, Bernard Romaine, November 10, 1947
Houston, Sam H., April 19, 1947
Lane, Alfred C., April 16, 1948
Melhorn, Ralph W., April 23, 1947
Price, Arthur S., January 31, 1948
Richards, H. C., June 14, 1947
Schweer, Henry F., October 25, 1947
Snider, L. C., May 24, 1947
Travis, Abe, December 13, 1947
Woolley, Glen C., October 29, 1947

Associate

Hiller, Carl F., January 17, 1946

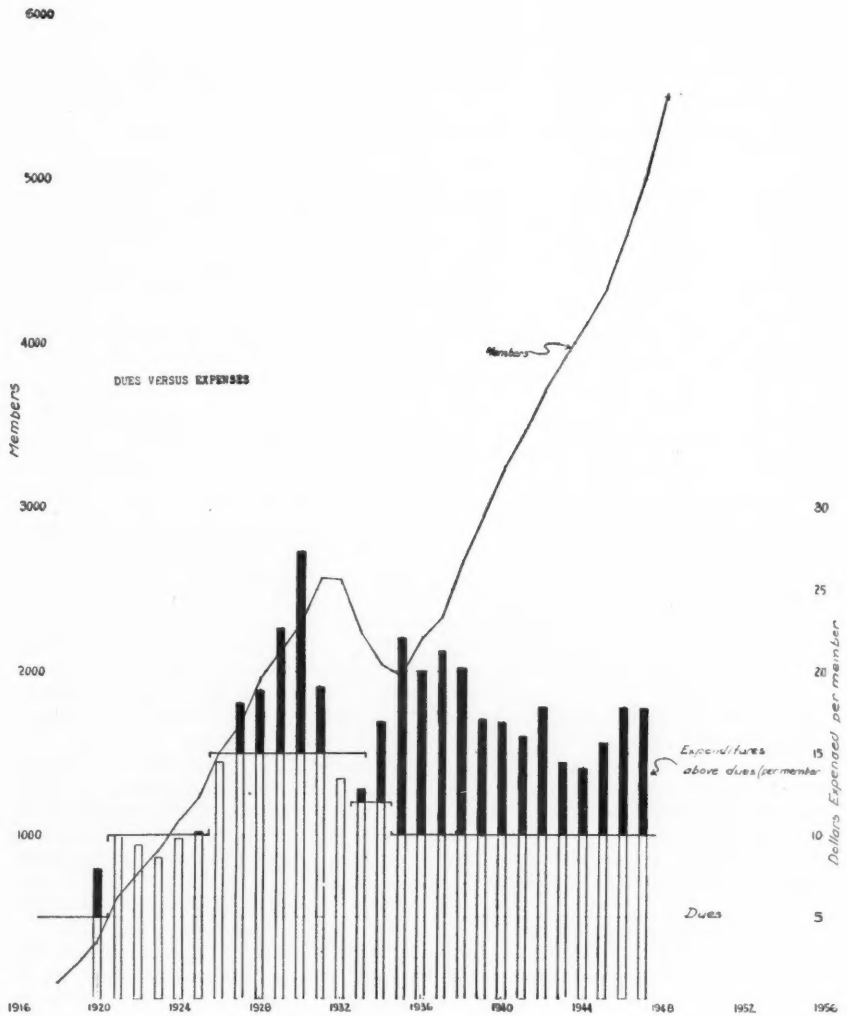

DUES VERSUS EXPENSES
Members
Dollars Expended per member
Members
Expenditures above dues per member
Dues
6000
5000
4000
3000
2000
1000
30
25
20
15
10
5
1916
1920
1924
1928
1932
1936
1940
1944
1948
1952
1956

FIG. 1

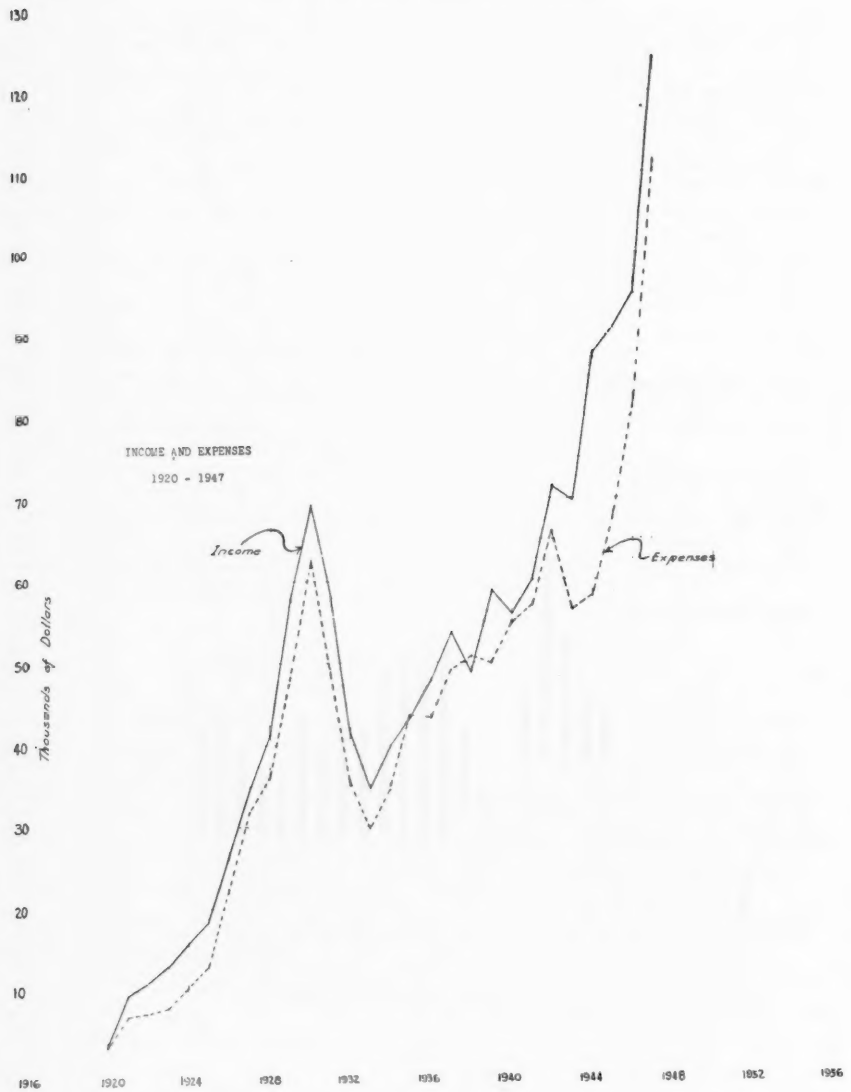

INCOME AND EXPENSES
1920 - 1947
Income
Expenses
Thousands of Dollars
130
120
110
100
90
80
70
60
50
40
30
20
10
1916
1920
1924
1928
1932
1936
1940
1944
1948
1952
1956

FIG. 2

Income of the Association also reached a new peak, but unfortunately so also did the universal enemy, expense. Yet the chart (Fig. 2) shows that income still is slightly in the lead, as it has been in every year save two since the Association was organized. To summarize the statistics given herewith, and in the report of the auditors, published in the March *Bulletin*, the following may suffice.

SUMMARY OF CHANGES FROM PREVIOUS YEAR IN INCOME AND EXPENSE

	Increase
Income increased from these sources:	
Dues from increased membership	4,124.00
Increased subscriptions for *Bulletin*	963.81
Sale of Publications, increase	10,678.50
Increased income from investments	1,741.56
Profit on sale of investments, increase	2,551.70
Inventory increase	10,369.80
	Decrease
Income decreased from these sources:	
Advertising in *Bulletin*	71.63
Sale of back numbers *et cetera*	1,049.21
Increase in costs	
Salaries, increase	1,378.30
Cost of Publications, increase	27,201.36
Increases to Research and to S.E.P.M.	1,252.29
Increase in Rent	1,486.00

Thus, while income from dues, from investments, and from sale of publications has increased, returns from advertising and sale of back numbers have declined. Fortunately, advertising revenue can be increased by adjusting the page rate to that figure justified by the circulation of the *Bulletin*, which is now 5,653, and this has been done, effective January 1, 1948. Sale of back numbers will continue so long as membership increases, but can not be increased greatly owing to depletion of stock of early numbers. Continued increase in dues income may be expected so long as the membership grows.

During the year, under the guidance of our newly appointed finance committee, some changes were made in the investment portfolio. Certain securities which has shown extensive losses during the depression, and after a lapse of 20 years, had displayed little improvement, were replaced by more vigorous ones, while others which appeared to have reached their maximum valuation, were also sold and the returns invested in stocks showing better growth possibilities. Despite the fact that 50 per cent of our invested funds are in Government bonds and preferred stocks, the net return from all investments this year was slightly more than 4 per cent, a figure that compares very favorably with similar funds held by insurance companies and other trusts. For these results the finance committee, Messrs. Pogue, Ivy, and Markham, and the investment counselor, Mr. Bradford Story, deserve unstinted praise.

From time to time members have been critical of the long-standing policy of the Association in building up a backlog of investments and of living within income. Study of Figure 1 may answer some of these criticisms, for it shows that in each year since 1927, excepting only the depression year 1932, each member has received more than he paid for. The cost per member during the past year has been $17.60 and the current cost of the *Bulletin* alone has now reached $0.569 per number, or approximately $7.91 per member per year. The difference between the amount of the dues and the total cost of running the Association has been made up by interest on investments and profit from *Bulletin* advertising.

Perhaps another form of criticism can be answered by Figure 3, in which are shown the steady climb in total assets (solid line) and the declining tendency of the assets per member. The reason is simple, for each new member brings in only his annual dues, and the only way

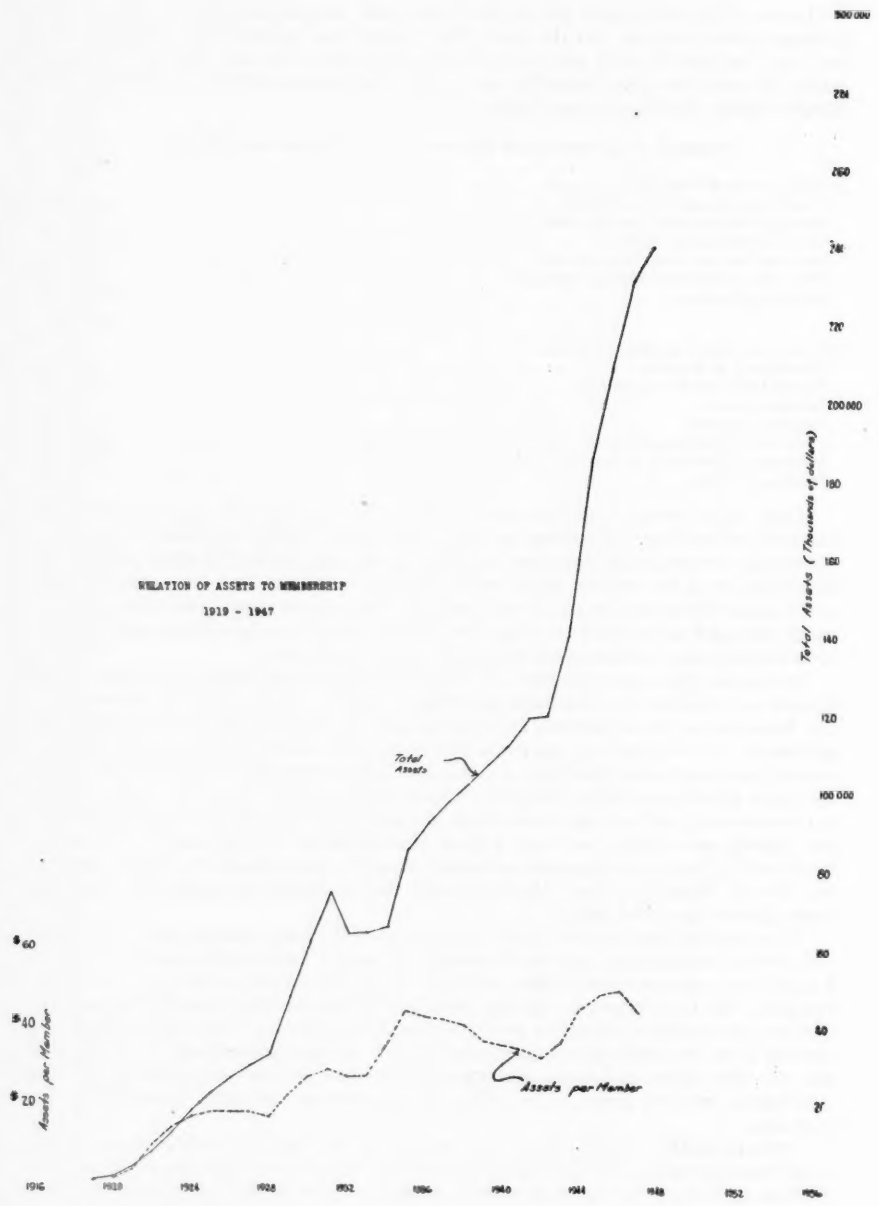

RELATION OF ASSETS TO MEMBERSHIP
1919 - 1947
Total Assets
Assets per Member
Total Assets (Thousands of dollars)
Assets per Member
$60
$40
$20
1916
1919
1924
1928
1932
1936
1940
1944
1948
1952

FIG. 3

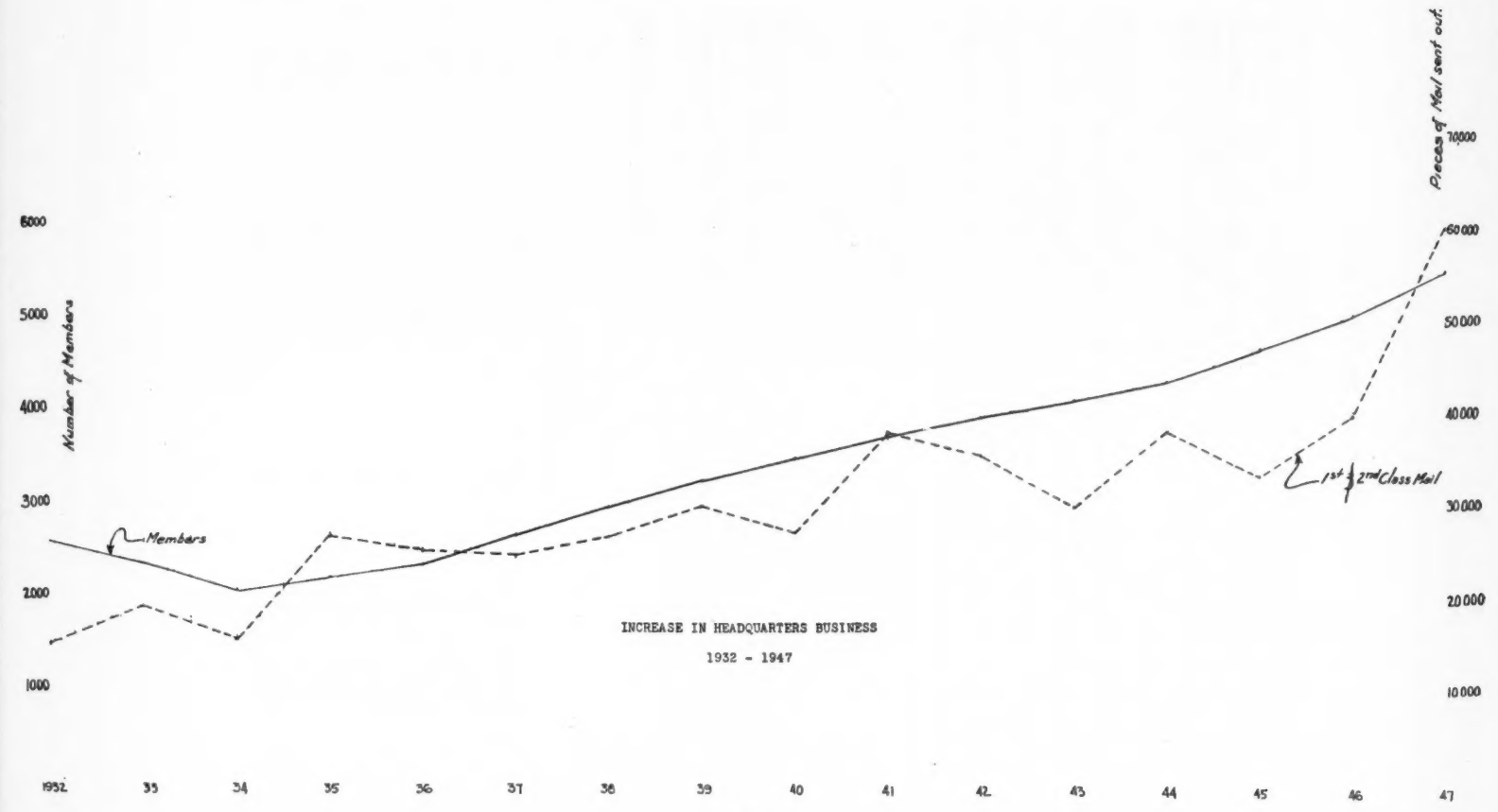

Number of Members
Pieces of Mail sent out
6000
5000
4000
3000
2000
1000
70000
60000
50000
40000
30000
20000
10000
Members
1st & 2nd Class Mail
INCREASE IN HEADQUARTERS BUSINESS
1932 - 1947
1932
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47

FIG. 4

in which increased membership can overcome this handicap is to increase the *Bulletin* circulation, thereby eventually leading to an increase in advertising rates. Thus, our phenomenal growth in membership and assets leaves us no richer financially than before. Meantime, the present secretary-treasurer, with a tip of his hat to his predecessors who established our fiscal policy, feels that the financial policy should not be changed, that the Association should continue to live within its income, and that something each year should be added to reserve for the future. With this policy the executive committee has been in wholehearted agreement.

During the year it has been necessary to move the Headquarters from its long-time location in the Wright Building in Tulsa. Like all other cities, Tulsa is short of office space, and the business manager therefore is to be congratulated in having obtained considerably better quarters in the Chestnut and Smith Building at 624 South Cheyenne. No further moves will be necessary as these offices are leased for a term of 5 years.

Thirty years have now passed since formal organization of the A.A.P.G. and it may be interesting to note that of the 94 charter members of 1917, 52 retain their memberships, 22 have died, and 20 have dropped out. Of the latter group, only 5 are known to be still in geological work related to petroleum, and 3 are teaching.

Executive committee meetings were held as follows.

March 26–27, 1947	Biltmore Hotel, Los Angeles
May 6, 1947	Tulsa, Oklahoma
August 4, 1947	Cody, Wyoming
November 4, 1947	San Antonio, Texas
January 13, 1948	St. Louis, Missouri
April 24 and 26, 1948	Denver, Colorado

Throughout the year the Headquarters staff has functioned efficiently, despite the handicaps of greatly increased volume of work, and the tribulations of moving. The vastly increased work resulting from an increased membership, expanded program of publication, and increased number of meetings is shown graphically in Figure 4, and in the accompanying tables. An average of nearly 200 letters each business day is a new record and an increase of 50 per cent over the previous year.

J. V. HOWELL, *secretary-treasurer*

TABLE I

TOTAL MEMBERSHIP BY YEARS

May 19, 1917	94	March 1, 1933	2,336
February 15, 1918	176	March 1, 1934	2,043
March 15, 1919	348	March 1, 1935	1,973
March 18, 1920	543	March 1, 1936	2,169
March 15, 1921	621	March 1, 1937	2,331
March 8, 1922	767	March 1, 1938	2,646
March 20, 1923	901	March 1, 1939	2,951
March 20, 1924	1,080	March 1, 1940	3,240
March 21, 1925	1,253	March 1, 1941	3,474
March 1, 1926	1,504	March 1, 1942	3,717
March 1, 1927	1,670	March 1, 1943	3,393
March 1, 1928	1,952	March 1, 1944	4,109
March 1, 1929	2,126	March 1, 1945	4,326
March 1, 1930	2,292	March 1, 1946	4,676
March 1, 1931	2,562	March 1, 1947	5,039
March 1, 1932	2,558	March 1, 1948	5,530

TABLE II

COMPARATIVE DATA OF MEMBERSHIP

	March 1, 1947		*March 1, 1948*	
Number of honorary members	15		16	
Number of life members	14		15	
Number of members	3,871		4,185	
Number of associates	1,139		1,314	
Total number of members and associates		5,039		5,530
Net increase in membership		363		491
Total new members and associates	406		525	
Total reinstatements	51		25	
Total new members and reinstatements		457		550
Applicants elected, dues unpaid	30		16	
Applicants approved for publication	82		63	
Recent applications	124		170	
Total applications on hand		236		249
Applicants for reinstatement elected, dues unpaid	1		0	
Recent applications for reinstatement	1		2	
Total applications for reinstatement on hand		2		2
Applicants for transfer approved for publication	41		22	
Recent applications for transfer on hand	47		36	
Total applicatoons for transfer on hand		88		58
Applications for life membership on hand				2
Number of members and associates resigned	24		22	
Number of members and associates dropped	47		25	
Number of members and associates died	23		12	
Total loss in membership	94		59	
Total gain in membership		457		550
Number of members and associates in arrears, previous years	39		95	
Members in arrears, current year	416		425	
Associates in arrears, current year	177		183	
Total number members and associates in arrears, current year		593		608
Total number members and associates in good standing		4,407		4,827

TABLE III

Geographic Distribution of Members

March 1, 1948

Alabama	19	Louisiana	309	Ohio.	40
Arizona	9	Maryland	8	Oklahoma	719
Arkansas	25	Massachusetts	23	Oregon	5
California	644	Michigan	51	Pennsylvania	88
Colorado	173	Minnesota	11	South Carolina	2
Connecticut	8	Mississippi	88	South Dakota	8
Delaware	2	Missouri	29	Tennessee	12
Dist. of Columbia	65	Montana	30	Texas	1,738
Florida	43	Nebraska	9	Utah	17
Georgia	6	Nevada	2	Virginia	7
Illinois	114	New Jersey	16	Washington	20
Indiana	47	New Mexico	70	West Virginia	21
Iowa	10	New York	140	Wisconsin	9
Kansas	176	North Carolina	6	Wyoming	107
Kentucky	23	North Dakota	3		
	Total members in United States				4,952
Alaska	3	Dominican Republic	1	Nova Scotia	1
Algeria	4	Ecuador	2	Ontario	21
Alberta	63	Egypt	12	Palestine	4
Angola	1	England	12	Panama	4
Argentina	14	Ethiopia	1	Papua	1
Australia	10	France	9	Paraguay	2
Austria	2	Germany	1	Persian Gulf	4
Bahamas	2	Gold Coast	1	Peru	16
Barbados	1	Guam	1	Philippine Islands	2
Belgian Congo	1	Haiti	1	Puerto Rico	1
Belgium	1	Hungary	1	Quebec	2
Bolivia	1	India	2	Roumania	1
Borneo	1	Iraq	1	Saskatchewan	1
Brazil	9	Italy	1	Saudi Arabia	8
British Columbia	5	Java	1	Spain	1
British Guiana	1	Mexico	16	Sumatra	4
Burma	2	Morocco	3	Switzerland	6
Chile	8	Netherlands	14	Syria	7
China	2	New Brunswick	1	Tasmania	1
Colombia	72	New Caledonia	1	Trinidad	13
Costa Rica	1	New Zealand	3	Turkey	4
Cuba	9	Nicaragua	1	Uruguay	1
Denmark	6	Nigeria	1	Venezuela	167
	Total members in foreign countries				578
	Grand total				5,530

TABLE IV

COMPARISON OF ACCRUED INCOME BY CALENDAR YEARS

	1945	1946	1947
Dues			
Members	$34,900.00	$38,590.00	$ 41,580.00
Associates	6,866.00	8,304.00	9,438.00
Total	$41,766.00	$46,894.00	$ 51,018.00
Bulletin			
Subscriptions	$ 5,774.52	$ 6,752.49	$ 7,716.30
Advertising	21,533.09	22,591.73	22,520.10
Total	$25,307.61	$29,344.22	$ 30,236.40
Back Numbers, etc.			
Bound Volume of Bulletin	$ 3,479.50	$ 3,139.75	$ 2,900.20
Back Numbers of Bulletin	2,507.36	3,077.16	2,765.87
Other Publications	595.44	413.19	174.82
Total	$ 6,582.30	$ 6,630.10	$ 5,840.89
Special Publications			
Geology of Natural Gas*	$ 487.20	$ 124.20	$ —
Geology of Tampico Region*	212.90	323.45	294.35
Gulf Coast Oil Fields*	392.60	89.80	3.00
Map of Southern California*	34.50	49.60	37.05
Miocene Stratigraphy of California*	233.00	510.05	504.00
Recent Marine Sediments	4.00	—	—
Stratigraphic Type Oil Fields*	1,376.95	1,606.70	812.55
Source Beds of Petroleum*	685.05	598.50	182.75
Possible Future Oil Provinces	607.78	245.65	398.60
Origin of Oil	13.90	—	—
Comprehensive Index	—	—	6,077.00
Petroleum Discovery Methods	98.70	—	—
Sedimentation	3.00	—	—
Tectonic Map of United States	5,635.90	2,184.85	1,323.00
Directory, Geol. Inf. in North America	—	76.50	223.50
Structure of Typ. Amer. Oil Fields, Vol. I*	—	—	2,928.00
Structure of Typ. Amer. Oil Fields, Vol. II*	—	—	3,704.00
	$ 9,785.48	$ 5,809.30	$ 16,487.80
Other Income			
Delinquent Dues Charged Off	$ 1,104.65	$ 886.49	$ 401.07
Interest, General Fund	2,818.78	3,767.94	5,463.86
Interest, Publication Fund	757.76	817.00	880.68
Interest, Research Fund	61.36	33.99	17.40
Interest, Powers Medal Fund	232.50	233.95	232.50
Profit, Sale of Investments, General	1.50	245.00	1,106.92
Profit, Sale of Investments, Publication	41.25	—	1,689.78
Profit, Sale of Investments, Research	—	91.97	—
Miscellaneous	188.35	158.73	219.17
Sale of Library	16.00	5.00	19.50
Members Reinstated	46.50	20.00	34.00
Regional Cross Sections	18.40	—	—
Inventory Increase	—	—	10,369.80
Donations, Powers Medal Fund	—	100.00	—
Total	$90,728.44	$95,037.69	$124,017.77

* Income of Publication Fund.

TABLE V

COMPARISON OF ACCRUED EXPENSES BY YEARS

General and Administrative Expenses	*1945*	*1946*	*1947*
Salaries—Managerial and Clerical	$10,852.94	$14,142.80	$ 15,521.10
Payroll Taxes	538.13	275.86	456.85
Rent	2,037.00	2,485.50	3,971.50
Telephone and Telegraph	379.05	569.44	450.34
Postage	2,383.88	2,904.71	3,376.20
Office Supplies and Expenses	1,146.87	790.62	944.85
Printing and Stationery	712.14	1,086.27	822.08
Audit Expense	300.00	300.00	300.00
Insurance	295.32	248.47	328.92
Freight and Express	503.60	213.17	291.93
Convention Expense (Net)	241.77	1,089.97	508.73
Bad Debts	351.84	802.26	744.23
Miscellaneous	449.35	683.06	504.88
Depreciation—Furniture and Fixtures	—	1,466.18	307.20
Investment Counsel	400.00	400.00	400.00
Traveling Expenses	274.24	1,899.00	175.24
Research Projects and Expense	1,018.49	2,414.21	3,166.50
Donation—Soc. Econ. Paleon. and Mineralogists	1,000.00	1,500.00	2,000.00
Distinguished Lecture Committee	—	500.00	—
National Service Committee	11.57	—	116.49
American Geol. Institute	22.44	—	—
Powers Medal Expense	305.48	—	248.29
President's Award	100.00	100.00	100.00
Moving Expense	—	—	1,137.83
Committee on App. of Geol.	—	—	193.00
Total	$23,324.11	$33,871.52	$ 36,066.16
Publication Expenses			
Salaries—Managerial and Editorial	$ 8,317.17	$ 9,073.11	$ 12,630.00
Printing Bulletin	22,505.48	25,965.83	32,914.84
Engravings	2,016.53	2,337.40	3,233.75
Separates	305.46	615.44	1,383.64
Stencils and Mailing	341.15	112.54	106.61
Binding Bulletins	674.48	836.73	912.59
Postage and Express (Bulletins)	929.83	1,170.20	1,383.94
Copyright Fees	24.00	24.00	24.00
Freight, Express, Postage (Other Publications)	87.56	131.05	327.09
Miscellaneous	41.39	45.73	13.57
Special Publications	1,686.75	1,958.49	19,592.16
Special Publication Inventory Decrease	7,451.92	3,256.83	—
Regional Cross Sections	18.84	—	—
Special Insert Charges	—	2,532.49	2,739.01
Total	$44,400.56	$48,059.84	$ 75,261.20
Total Expense	$67,724.67	$81,931.36	$111,327.36

TABLE VI

COMPARISON OF NET INCOME BY YEARS

	1945	*1946*	*1947*
Accrued Income	$90,728.44	$95,037.69	$124,017.77
Expenses			
General and Administrative	23,324.11	33,871.52	36,066.16
Publication	44,400.56	48,059.84	75,261.20
Total	$67,724.67	$81,931.36	$111,327.36
Excess Income over Expenses	$23,003.77	$13,106.33	$ 12,690.41

TABLE VII

INVESTMENTS

	Cost	*Market Value End of Year*
1945 Values		
General Fund	$ 82,552.18	$ 86,503.70
Publication Fund	29,605.09	31,090.21
Research Fund	2,667.87	2,780.37
Powers Medal Fund	9,300.00	9,050.40
Life Membership Fund	2,400.00	2,340.80
Total	$126,525.14	$131,765.48
1946 Values		
General Fund	$109,635.48	$110,698.12
Publication Fund	29,632.21	30,299.39
Research Fund	1,736.81	1,736.81
Powers Medal Fund	9,300.00	8,916.60
Life Membership Fund	2,800.00	2,707.20
Total	$153,104.50	$154,358.12
1947 Values		
General Fund	$122,774.97	$126,023.51
Publication Fund	27,862.14	26,191.61
Research Fund	1,754.21	1,754.21
Powers Medal Fund	9,300.00	8,816.40
Life Membership Fund	2,800.00	2,677.60
Total	$164,491.32	$165,463.33

TABLE VIII

COMPARISON OF COST OF BULLETIN

	1945	*1946*	*1947*
Total Expenses	$35,152.39	$42,713.47	$55,341.95
Monthly Edition	5,900	6,300	7,000
Total Copies Printed	70,200	75,600	84,000
Total Pages Printed, including covers	2,448	2,776	3,022
Total Pages of Text	1,819	2,119	2,268
Total Cost per Copy	0.50	0.565	0.659

TABLE IX

(Section 1)

SPECIAL PUBLICATIONS

	Geology Tampico Region (1936)	*Tectonic Map of California* (1936)	*Miocene Stratigraphy of California* (1938)	*Stratigraphic Type Oil Fields* (1942)	*Source Beds of Petroleum* (1942)	*Total*
Inventory						
Dec. 31, 1946	$ 779.21	$ 15.84	$1,262.25	$ 465.63	$ 147.00	$2,669.93
Dec. 31, 1947	618.30	9.76	980.10	28.22	34.30	1,670.68
Sales	294.35	37.05	504.00	812.55	182.75	1,830.70
Total Edition	1,575	940	1,530	2,526	1,539	
Copies on Hand						
Dec. 31, 1946	349	198	510	165	60	
Dec. 31, 1947	270	122	396	10	14	
Number of Pages	280	—	450	902	566	
Cost (inventory) per copy	$ 2.29	$ 0.08	$ 2.475	$ 2.822	$ 2.45	
Selling Price						
Members and Associates	3.50	.50	4.50	4.50	3.50	
Non-Members	4.50	.50	5.00	5.50	4.50	

TABLE IX

(Section 2)

SPECIAL PUBLICATIONS

	Struct. of Typ. Amer. Oil Fields Vol. I (1929)	*Struct. of Typ. Amer. Oil Fields Vol. II* (1929)	*Possible Future Oil Provinces* (1941)	*Tectonic Map of U. S.* (1944)	*Dir. Geol. Mat. in N. A.* (1946)	*Index to AAPG Publ.* (1947)	*Total*
Inventory							
Dec. 31, 1946	$ —	$ —	$ 6.85	$ 412.76	$ 299.66	$ —	$ 719.27
Dec. 31, 1947	119.70	259.35	308.74	1,907.91	246.56	11,002.82	13,845.08
Sales	2,928.00	3,704.00	398.60	1,323.00	223.50	6,077.00	14,654.10
Total Edition	1,039[2]	1,027[2]	4,097[1]	7,000[3]	1,817	6,067	
Copies on Hand							
Dec. 31, 1946	—	—	17	331	1,693	—	
Dec. 31, 1947	63	95	718	1,530	1,393	4,104	
Number of Pages	510	780	154	—	111	603	
Cost (inventory) per copy	$ 1.90	$ 2.73	$ 0.43	$ 1.247	$ 0.177	$ 2.681	
Selling Price							
Members and Associates	3.00	4.00	1.00	1.75	0.75	3.00	
Non-Members	3.00	4.00	1.50	1.75	0.75	4.00	

[1] 1,047 copies reprinted in 1947.
[2] 2,000 copies reprinted in 1947.
[3] Reprinted in 1947.

EXHIBIT IV. REPORT OF EDITOR

During the year 1947 the American Association of Petroleum Geologists completed its thirtieth year of existence. In three decades the body has grown from its childhood charter membership of 94 to its present robust maturity exemplified in 5,530 members and associates who guide the exploratory activities of the oil industry of America as well as of much of the land beyond the seas. From Alaska to Zanzibar our men are deployed on the petroleum front assiduously applying the principles and practices of geology to the problem of satisfying the evergrowing world demand for more oil.

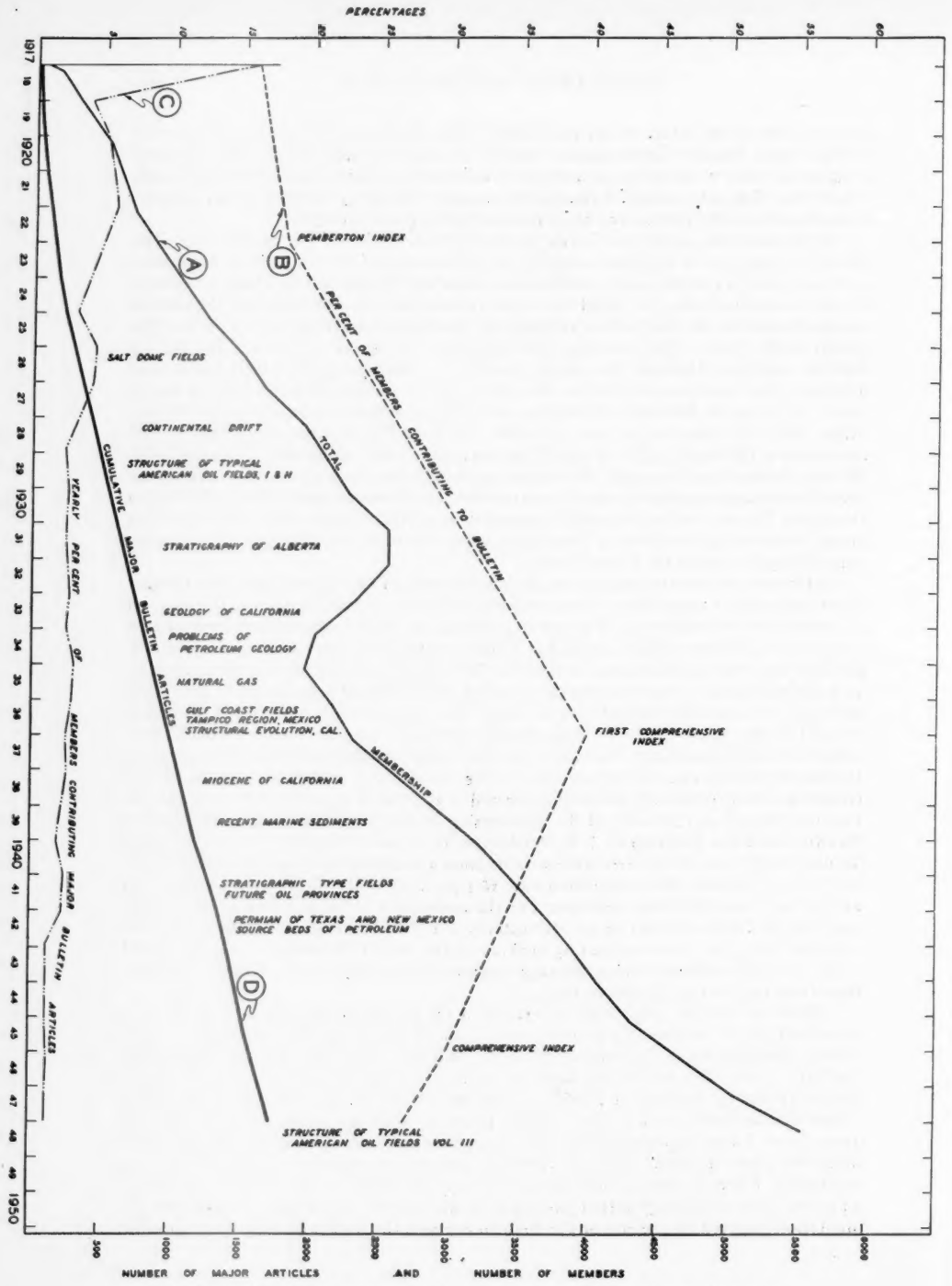
It might be anticipated that the phenomenal progressive membership growth of the Association and the worldwide search for new reserves of crude oil would each exert noteworthy influence on the table of contents of the *Bulletin*. It shall be the purpose of this report to search for these influences and to draw from the findings conclusions which would

seem to bear on the future of our publication. The completion during the present year of Miss Daisy Heath's *Comprehensive Index* of Association publications makes possible a statistical study of elaborate proportions of which only a start is made here. From such a study may flow data usable for charting the course of thinking followed by our contributing members of the past as well as for forecasting the trends to come.

Of fundamental significance is the geographic distribution of our membership. The March 1, 1948, list of members names 5,519 individuals; of these 1,308 are associates, 4,181 are active, 15 are life, and 15 are honorary members. Nearly half the charter members of 1917 are active to-day; it would then seem reasonable to assume that half the present associate members at least will be carrying on Association activities at the end of the second thirty years. Their training and experiences of to-day will leaven the loaf of *Bulletin* substance through the coming generation; their geographic distribution will determine the framework of *Bulletin* contents. To-day our members reside in 44 of the 48 states, including the District of Columbia, and in 67 countries or areas outside the United States. But less than 600, or 10.4 per cent, are domiciled outside continental United States and of these only 138, or about 2.5 per cent of the total membership, live outside the Western hemisphere. So despite the obvious growing importance of overseas exploratory activities it is apparent that to-day at least our title, the *American* Association of Petroleum Geologists, has not lost its geographic appropriateness. Ninety-seven and one-half per cent of our membership is resident in North and South America; almost 90 per cent of us are yet privileged to live in the United States.

Let us now review the publication accomplishments of the Association. Miss Heath's latest *Index* lists 1,405 authors who have contributed one or more articles to the pages of 29 volumes of the *Bulletin* and of 17 special publications. These 1,405 authors have written 1,603 major *Bulletin* articles, about 650 geologic notes, and more than 200 memorials besides many reports, discussions, and reviews. They have made reference in their writings, to 6,046 individuals whose names were regarded as of sufficient significance to petroleum geologists to justify their inclusion in the *Index*. The membership at the close of the period covered by the *Index* was 4,676. Thus, about 30 per cent of our net membership had contributed *Bulletin* material to that time. The first *Comprehensive Index* was issued in 1937; the period covered was the first 20 years of the Association's existence. It lists 936 contributing authors from a membership at the end of 20 years of 2,331. Contributing authors thus constituted 40.1 per cent of the membership for the period 1917–1927. The earliest *Bulletin Index* was prepared by J. R. Pemberton; it appeared following the completion of Volume 6, and lists 166 contributing authors from a membership of 901. Contributors to the first six volumes thus constituted only 18.4 per cent of the membership. Volumes 30 and 31 have been published subsequent to the appearance of the last *Index*. Their pages carry major articles written by 91 new authors. On March 1, 1948, our membership had increased to 5,530; our contributing authors at the end of December, 1947, numbered 1,496. The approximate total percentage membership participation in *Bulletin* contributions from 1917 to 1947, inclusive, is 27.

These matters are graphically portrayed in the accompanying figure. Curve A is a numerical plot of membership against years; Curve B represents the percentage of membership participation in *Bulletin* contributions. Only five points have been determined for the latter curve; they are derived from: (1) authors in Volume 1; (2) authors in the Pemberton *Index;* (3) authors in the first *Comprehensive Index;* (4) authors in the second *Comprehensive Index;* and (5) new authors added in Volumes 30 and 31. It is apparent from Curve A that two world wars have been periods of large membership rate increases while the years of drastic economic recession between, completely reversed the war-year tendencies. Curve B seems to indicate that somewhere in the middle thirties a maximum of membership percentage author participation was passed. It might be thought that the limitation imposed by the size of the *Bulletin* explains the decline in percentage member



Graph showing relation between membership growth and Association publications.

authorship, but, were this true, a large waste-basketfull of unpublished manuscripts should be gathering dust in a dark corner at headquarters. Joe Hull has never encountered this house-keeping problem.

What have our 1,496 authors chosen to write about in their 1,751 major *Bulletin* articles? I have attempted one answer by differentiating the articles into four categories. This classification assigns all papers to either: (1) oil- and gas-field description; (2) studies in paleontology and stratigraphy; (3) regional studies of geology and developments; or (4) miscellaneous.

Perhaps no two classifiers would obtain identical results in attempting to set out the four categories chosen for this report. Much overlapping of subject matter inherently and necessarily exists between all the classes in most of the papers. Thus no oil-field paper is entirely divorced from stratigraphy, no stratigraphic paper is without reference to if it is not actually mainly concerned with regional geology and *vice versa*. Any of the three may be given over largely to material which would seem to belong with the miscellaneous class. In that class have been placed papers devoted to theoretical discussions, descriptions of techniques whether in the field or laboratory, enunciation of principles, declarations of policy and so on. Most of our really important contributions to science and technology are thus obscured in miscellany. But, such as it is, the classification results as follows:

Classes	*Number*	*Percentage of Total*
1. Oil-field descriptions	202	11.5
2. Stratigraphy and paleontology	318	18.0
3. Regional geology and developments	665	38.0
4. Miscellaneous	566	32.5
Total	1,751	

The high percentage of papers devoted to regional geologic and development studies is somewhat unexpected. Can it be that our thinking is tending to pass from the particular to the general as we grow older as an Association? The low percentage of oil- and gas-field descriptions seems to say yes.

In order to observe the present trends in authors and subject matter a breakdown of the major articles in Volume 31 was made. The results surprisingly emphasize the affirmative answer to the foregoing query. For oil-field descriptions constitute only 3.9 per cent; stratigraphy and paleontology, 21 per cent; regional geology and developments, 51.4 per cent, and miscellaneous, 23.7 per cent. Contributors to Volume 31 numbered 193 of which 84 were authors or co-authors of major articles. Two affiliated societies furnished a major each. Of the 84 major paper authors 6 were non-members, 3 were charter members, and 77 were members whose years of affiliation occurred in all but two of the 30 years of the Association's existence. About half the major authors of our last volume have been members less than 10 years. Although only a little more than 10 per cent of our members are domiciled outside the United States, our 1947 papers dealing with foreign geology were about 16 per cent of the volume's total. This percentage may be confidently expected to gradually increase in the future.

Turning our attention again to the graph we observe that Curve C shows the yearly per cent of members of that year who contributed major papers for *Bulletin* use. In the first year 16 per cent of the members were authors; in 1947 only a little more than 1½ per cent were inspired to write. That percentage however was adequate to maintain the uniformly straight, majestically upward-directed Curve D which portrays the cumulative major contributions which have been given to science and technology through the pages of our *Bulletin*. The serene progress of that curve pays tribute to the illustrious men who have preceded me in the office of editor; it testifies to the little-sung prowess of the headquarters staff; but above all it reflects the sober earnestness of that quarter of you who furnished the material published.

The editor welcomes this opportunity of thanking the associate editors for the unstinted support maintained by them throughout the past year; he is grateful to his colleagues on the executive committee whose ever ready counsel was sustaining; he loudly commends the efficient headquarters staff which, though hampered by the necessity of moving, maintained business as usual through trying times; and he humbly avows his appreciation of the patient tolerance with which the Association membership has accepted his first year of editorial service.

C. L. Moody, *editor*

Exhibit V. Report of Resolutions Committee

Be it resolved, that we, in behalf of the members of The American Association of Petroleum Geologists and the associated Society of Economic Paleontologists and Mineralogists and the Society of Exploration Geophysicists express our sincere thanks and appreciation to the following.

1. To the officers of The American Association of Petroleum Geologists for their leadership and personal sacrifice in the advancement and welfare of our organization, and particularly to our retiring President, Carroll E. Dobbin, for his untiring service and his scholarly presidential address which, we believe, defines and points the way toward a final grand objective—social service.

2. To Thos. S. Harrison and A. E. Brainerd, chairmen of the general committee, for directing the organization responsible for the outstanding success of the 33d annual meeting in Denver, Colorado.

3. To C. E. Manion, president, and to the members of the Rocky Mountain Association of Geologists, who have served so generously and successfully as hosts to the annual meeting.

4. To The Honorable W. Lee Knous, Governor of Colorado, for inviting Senator Antonio J. Bermudez, Director, Petroleos Mexicanos, Mexico, D. F., to be a guest speaker at our opening meeting.

5. To C. S. Lavington, L. Brundall, Karl L. Walter, and other members of the hotels and housing committee for securing accommodations for our members and guests.

6. To the Denver Convention Bureau and to Mrs. E. L. John for their effective coordination of effort with the hotels and housing committee.

7. To the managements of the Shirley-Savoy and Cosmopolitan hotels for their willing cooperation in providing facilities for the general and special meetings, and to these and other hotels for providing accommodations for those in attendance. We especially thank Ike Walton, manager of the Shirley-Savoy, for his assistance.

8. To Daisy C. Hansen, of Los Angeles, for efficient and gracious handling of the numerous duties centering at the Convention service desk.

9. To R. McMillan and his committee for a well organized, effective, and efficient registration system.

10. To N. W. Bass and R. L. Heaton for arranging an inspiring and well coordinated technical program.

11. To J. W. Vanderwilt, W. O. Thompson, Harry Oborne, and F. M. Van Tuyl for arranging and conducting the convention field trips, and for their contributions to the "Guide to the Geology of Central Colorado."

12. To Harry M. Crain and to the *Oredigger* staff of the Colorado School of Mines for daily coverage of convention affairs in the special editions of the *Oredigger*.

13. To H. E. Christensen for selecting and arranging an excellent variety of commercial and other exhibits.

14. To Mrs. J. Harlan Johnson and Mrs. C. E. Manion, chairmen of the ladies' committees, and to their committee members, for assisting in registration, and for arranging

the book review, the tea, and fashion show, and for providing other entertainment for the visiting ladies.

15. To Clarence L. Moody for his service to the Association as editor for the past year.

16. To the Bay Petroleum Corporation for the largest open-house party in the history of A. A. P. G. conventions.

17. To Bob Lewis, of Lewis and De Groat, of Denver, for installing the public address systems, projection equipment, and other apparatus necessary to convention requirements.

18. To the Paradice Flag and Decorating Company of Denver for well arranged exhibit booths and signs.

19. To all individuals and companies for their generous contributions to help defray the expenses of this meeting.

20. To Geo. R. Downs, chairman of the transportation committee, and to all other committee chairmen, committee members, and other individuals who gave freely of their time in assuring a successful and well organized annual meeting.

Be it further resolved, that these resolutions be included in the minutes of the meeting, and that copies be sent to the individuals and organizations named.

W. A. WALDSCHMIDT, *chairman* J. S. IRWIN E. E. REHN

EXHIBIT VI. REPORT OF REPRESENTATIVE ON DIVISION OF GEOLOGY AND GEOGRAPHY OF NATIONAL RESEARCH COUNCIL FOR YEAR 1947

An important function of the Division of Geology and Geography of the National Research Council is to serve as a clearing house through which geologists working in diverse fields may be brought together, and as a liaison between geologists and workers in other sciences. During the year 1947, under the chairmanship of Arthur Bevan of the Illinois Geological Survey, the following activities of this type were carried forward.

An outstanding development was a movement to link more closely the proposed American Geological Institute with the National Research Council, following the example of institutes in other sciences. On October 27, 1947, a meeting was held of representatives of eleven geological and related societies, under the chairmanship of A. I. Levorsen, at which it was decided to "take advantage of the offer of the National Research Council to set up an American Geological Institute within the structure of the National Research Council." If carried out, this will have the effect of considerably broadening the base of usefulness of the National Research Council as a clearing house for geologists, and it will also cause considerable modification in the present manner of operation of the Division of Geology and Geography.

Four "borderland committees" were active in 1947, which include representives, not only of various fields of geology, but also of the other sciences concerned. These committees are (1) "On interrelation of Pleistocene research" (R. F. Flint, chairman), (2) "On interrelations of paleobotany" (L. R. Wilson, chairman), (3) "On application of biological methods and data to geologic problems" (G. E. Hutchinson, chairman), and (4) "On application of physics and chemistry to geologic problems" (J. F. Schairer, chairman). Another committee, "On common problems of genetics, paleontology, and systematics" (G. G. Simpson, chairman), completed its work in 1946, and has prepared an extensive symposium which is now edited and ready for publication. Such committees aid geologists in making available to their work the latest advances in other sciences.

The Division also aids in problems of geological education and personnel. It will be recalled that a "Committee on geological education" (C. R. Longwell, chairman) functioned during 1946, and produced a series of reports that were published in the *Interim Proceedings* of the Geological Society of America. This committee is now disbanded, but its results and conclusions were summarized during 1947. Similar work is being continued by a committee of the Geological Society of America (M. K. Hubbert, chairman), which held a joint conference with the Association of Geology Teachers at the December meeting

of the society, and whose results were published in the Interim Proceedings for March, 1948. A "Committee on advisory pamphlet for geology students" (C. H. Behre, chairman) that was also active in 1946 has similarly completed its work. Its advisory pamphlet has been prepared and awaits publication. The "Committee on geologic personnel" (W. B. Heroy, chairman) continued its work during 1947.

Committees of the Division whose work is of particular interest to petroleum geologists include:

The "Committee on stratigraphy" (C. O. Dunbar, chairman) has nearly completed its work of preparation and publication of correlation charts for the geologic systems of North America. Eight have already been published in the *Bulletin* of the Geological Society of America, and another, on the Mississippian, appeared in February, 1948. Work on the Ordovician chart is far advanced, but this system offers unusually complex problems, on which there is a wide divergence of opinion. A conference of the principal specialists on the subject was held January 25, 1948, in which agreement was reached as to the manner of treatment of the subject matter on the chart. It is now believed that the chart can go forward to publication.

The "Committee on symposium on sedimentation" (P. D. Trask, chairman) is at work on its symposium. In addition the committee has also proposed recently to take over preparation and publication of a rock color chart, work on which was initiated by five geological organizations. When published, the chart will probably be distributed through the National Research Council.

The "Committee on treatise on marine ecology and paleoecology" (H. S. Ladd, chairman) is likewise at work on a symposium, and much progress has been made in 1947. A report of the committee for the year was published by the National Research Council in March, 1948, which contains annotated bibliographies, short articles, and statements of activities.

A new "Committee on stratigraphic paleontology" has been set up early in 1948 under the chairmanship of R. C. Moore, and organization of the committee is now in progress.

A "Joint advisory committee on geophysics for the Office of Naval Research" has been appointed under the chairmanship of W. H. Newhouse, in order to advise the Office on research problems in the earth sciences. The objectives are stated to be "(1) to foster, in cooperation with other agencies, geological, geographical, and geophysical explorations of little known areas of the earth . . . ; (2) to conduct laboratory and field studies leading to greater understanding of the properties and processes existing in the outer hundred kilometers of the earth's crust; and (3) to develop instruments and techniques for determination of the earth's properties . . . "

The "Committee on tectonic map of United States" (C. R. Longwell, chairman) will probably be disbanded. This was set up to prepare a revision of the tectonic map published in 1944 by the American Association of Petroleum Geologists. However, the chairman finds that he cannot spare enough time from other duties for the work, and that corrections by users of the map are not being contributed as extensively as was first anticipated. It is therefore thought that revision of the map should be postponed until some years hence, when a more thorough and satisfactory revision can be obtained.

PHILIP B. KING, *representative*

EXHIBIT VII. REPORT OF REPRESENTATIVES ON AMERICAN COMMISSION ON STRATIGRAPHIC NOMENCLATURE

Work of the American Commission on Stratigraphic Nomenclature during the past year resulted in publication of Notes 3 to 6, inclusive, in the March, 1948, issue of the *Bulletin*. Petroleum geologists will be particularly interested in Note 4 on proposed rules for naming subsurface stratigraphic units. One of the Association's three representatives

on this Commission, Wayne V. Jones, is the principal author of this Note. The Commission is expected to take final action on these proposals after June 30. Meantime, suggestions and criticisms regarding these are invited by Commission chairman, Raymond C. Moore.

Rules of Geological Nomenclature of the Geological Survey of Canada; proposed definition and adoption of the terms "stage" and "age"; and discussion of nature and classes of stratigraphic units contained in the other three Notes should be of interest to discriminating geologists. The Commission will welcome comments regarding the latter two subjects.

Adoption by American geologists of the terms "stage" and "age" appears desirable, both from the standpoint of the need of a time-rock term subordinate to "series" and in the interest of more uniform usage internationally.

Every science requires its particular terminology. The Commission on Stratigraphic Nomenclature has been organized in the interest of developing as concise, exact and useful rules as possible for the naming and classifying of stratigraphic units; also for the interpretation of such rules. Service of this nature should be of much value to petroleum geologists in their extensive, constant work in stratigraphy.

The Association has been selected as the official publishing agency for the Commission. The Geological Society of America is cooperating by forwarding separate copies of the Commission's Notes and Reports to many individuals and agencies, and by maintaining a reserve stock for future distribution.

MONROE G. CHENEY, *chairman*

EXHIBIT VIII. REPORT OF COMMITTEE FOR PUBLICATION

As in previous years, the committee for publication has this year again assumed responsibility for securing authors for the annual development papers. Abstracts of these papers are in the convention program and the papers appear in the June *Bulletin.* Attention is called to the incorporation of a paper on foreign development on an annual basis. The paper by the same author, L. G. Weeks, covering highlights on development in foreign petroleum fields in the July, 1947, *Bulletin,* furnishes an excellent background for the current and subsequent annual papers. The practice has been continued of obtaining authors for these development papers early in the year so that their data can be progressively collected through the year.

The Association has found itself with an ample supply of excellent material for the *Bulletin;* therefore, no concerted effort has been necessary in this regard. The committee does take this opportunity to urge the membership at large to continue encouraging prospective authors to prepare papers of interest for publication in the *Bulletin.*

The committee takes this opportunity of expressing appreciation to the authors that have published material in the *Bulletin* and the chairman is very appreciative of the cooperative efforts by the committee as a whole.

LYNN K. LEE, *chairman*

EXHIBIT IX. REPORT OF RESEARCH COMMITTEE

The work of the research committee during the past year has been divided into two sharply distinct parts.

First, we prepared a final draft of our program of fundamental research in sedimentology and presented it to the American Petroleum Institute in accordance with our instructions. Although A.P.I. has accepted the more costly half of our recommendations (those dealing with Recent and Near-Recent sediments), it has rejected the other part which deals with Ancient sediments because it contains proposals for a great deal of work that is being done by the companies in their daily search for oil.

A special A.P.I. committee has been appointed to formulate specific projects within

the framework of our Recent sediments program, and find placement for them. That committee has $10,000 for expenditures.

It is recognized that the fully formulated program may require an annual budget of $200,000 a year, but as yet no part of this budget and no specific projects have been approved. That would come later after the specific projects had been formulated.

Let us now consider the state of activity of the original 12 projects.

Project 1, Clay minerals.—Segments E and F are a part of the Recent sediments program.

Segment A, which is Kerr's Clay Standard project has also been taken on by A.P.I.

Segments B and D are fundamental research that properly follow clay standards.

Segment C is Grim's proposal for investigation of clays in older rocks. It properly forms part of the Ancient sediments program.

Project 2, Evolution of hydrocarbons, is included in the Recent and Near-Recent program.

Project 3, Formation waters, is being conducted under Case's chairmanship. He has presented a progress report and has outlined plans for further work.

Project 4, Bacteria, is also included as an essential part of the Recent sediments program.

Project 5, Recent and Near-Recent sediments, is in the hands of A.P.I.

Projects 6, 7, and 8, Ancient sediments, Carbonate reservoirs, and Cementation.—All are partly included in Project 5, but for the greater part they are concerned with older rocks and deserve further consideration, along with segment C of clay minerals.

Project 9, Salt flowage, is being actively carried out by Balk, with the financial assistance of the University of Chicago.

Project 10, Faulting, is being worked on actively by King of the Section of Areal Geology of the U.S.G.S.

Project 11, Experimental tectonics, is a project of high potential value which has not been developed adequately because of the pre-occupation of the committee with our sedimentology program.

Project 12.—The same may be said of Project 12, *Bore-hole logging.*

Both Nettleton and Archie deserve our most sincere thanks for their readiness to develop these important projects and also for their patience in standing by.

These twelve projects could now be reorganized as eight, of which five are active. These are the following.

Project 1, Clay minerals, active.

Project 3, Formation waters, active.

Project 5, Recent sediments, active, containing all of Projects 2 and 4 and parts of Projects 1, 3, 6, 7, and 8.

Project 9, Salt flowage, active.

Project 10, Faulting, active.

Project 11, Experimental tectonics, to be activated.

Project 12, Bore-hole logging, to be activated.

Projects 6, 7, 8 and parts of 1, might be reorganized as a program of fundamental research in the sedimentology of pre-Pleistocene rocks.

In addition, the committee has under consideration research on the internal characteristics of reservoirs by a sub-committee headed by Dickey.

Possible research projects concerning the external geological setting of reservoirs are being considered by Wilhelm.

Considerable thought is also being given to the need for developing a fundamental research program in the chemistry of sedimentary rocks and their contained fluids.

The second part of this year's work by our research committee has been spent for the

most part in planning future work. The new chairman of the committee, John T. Rouse, has cooperated vigorously in this latter part of the work.

Our central thought in making these plans has been that the committee should now concentrate on implementing that part of our program that is not yet activated.

The very fact that the remaining part of our program is so close to our daily work makes it imperative for us to set up a clear distinction between cooperative research and research that should be conducted by individual companies. Only in this way can we expect to receive the full measure of cooperation that we must have for the most successful conduct of our work. On the other hand, we naturally want to keep the formulation of our projects as close to our daily work as is feasible, so that the results will fill our more urgent needs at the earliest possible date. This also is necessary to insure continued cooperation on the widest basis.

As an approach to this problem, let us take sedimentology as an example and let us divide research in that field into three classes.

First.—That which anyone would naturally do in making a critical sedimentary analysis of a prospective or proven oil province.

Second.—That work which should produce useful data on properties and relationships but which, because of its general or long-range character, or because of lack of sufficient materials, facilities or specialized personnel, could not be justified as part of an industrial program.

Third.—Those investigations which might conceivably produce values to petroleum geology but which appear to be too general and too long-ranged, or which offer other practical obstacles to effective investigation.

Logically, the middle classification must exist and it seems almost axiomatic that projects in that classification are the ones on which we should concentrate.

Up to this point, I have been taking for granted the reasons for our interest in research on Ancient sediments. Some of them are fairly obvious, but nonetheless, it may be well to state them briefly.

1. The most obvious reason and probably the most important, is that such research might be expected to increase our knowledge of properties and relationships in sedimentary rocks that would help us improve our performance as petroleum geologists.

2. The data that would be gathered in a program of fundamental research on recent sediments would not be self-interpreting. Collateral investigation of older rocks would help speed up the translation of results of the Recent program.

3. The present is surely the key to the past, but just as surely a knowledge of the past is essential to the formulation of most effective research on the Recent. Research on older sediments should help suggest improvements in the formulation of our Recent program, particularly in the later stages of its development.

4. A great deal of research on older sediments is being done in universities by both the staff members and their students. There is reason to believe that activity on our part in formulating specific projects would result in more of the work of universities and the various geological surveys being done along lines that are closer to our critical needs.

I have many letters in my files from men of the highest competence. The staff of the geological department and at least one of the students of the Colorado School of Mines is interested in our limestone reservoir investigations. The staff of the geological department of the University of Indiana, has expressed interest in developing a project dealing with the carbonates of the Chester series. F. Alton Wade of Miami University at Oxford, Ohio, has also expressed himself as being interested in carbonate reservoir studies, as follows.

. . . As a start I should like to have material from a small, but typical West Texas pool. It is my intention to subject the specimens, particularly core samples, to exhaustive tests, such as porosity, mineralogical composition, chemical composition, orientation of mineral grains, etc. Samples should

be obtained from wells as near along a traverse across the pool as possible, including dry holes beyond the pool limits. A map showing location of each well, pool limits, etc., is necessary. Sub-surface maps are desirable. Production figures and well logs would be helpful.

To assist me during the coming collegiate year, I will have a candidate for a Master's degree. It is my intention to assign a small unit of the investigation to him.

Again I wish to express my keen interest in this research program and trust a program can be worked out.

Sincerely yours,
F. ALTON WADE

In addition to this specific suggestion for research in a university, I know that other universities are carrying on broad regional studies ot ancient sediments. Kay at Columbia, Wanless at Illinois, and Krumbein, Dapples, and Sloss at Northwestern are among these. Krynine, at Pennsylvania State College, has been doing important work in sedimentary tectonics.

Petroleum geology is vital. It is full of new potential discoveries—full of as much good, new geology as can be found anywhere. No wonder top-ranking research men are interested in our findings.

We petroleum geologists also have access to materials, to cores and cuttings from deep wells; we know where these fit into the general over-all picture. We have in our Association the know-how of many thousand man-years of composite experience with field and wildcat wells, the behavior of strata in a three-dimensional surface and subsurface expression, the patterns of distribution of sediments and their relationship to commercial accumulation of oil and gas.

It seems reasonable to suppose that much of the work that is being done on sedimentary rocks in universities, state surveys and the U.S.G.S. will be closer to our interest when we do three things—and by "we," I mean all members and advisers of the research committee, not just the professional petroleum geologists.

1. We need to construct an adequate framework, based on our composite experience and needs. This framework might be thought of as a frame-of-reference, or as the sedimentary equivalent of the periodic table in which the relationship of each problem to all the others is shown as clearly as we can show it with our present knowledge.

An adequate framework would show most of the known relationships and would point out the glaring gaps in our "Periodic Table." It would show where the missing "elements" should be looked for. It would highlight a great many fascinating and useful problems that would have a tremendous appeal for any research worker.

2. We need to evaluate all potential projects in terms of economic interest, for on a proper selection depends the fullest measure of cooperation in supplying available data and materials.

3. We need to know where the best material can be obtained for a particular problem. For this we need to bring together available information from many sources—most of which are known and are available to members of local societies and sections of the A.A.P.G. Is the Woodbine or the Cherokee a better source of material for some particular research project on sands, clays or waters? What are the best limestone groups for carbonate reservoir studies; where are they located; who has the cores and other materials?

These are questions that can not be answered without the aid of the local geological societies and sections of the A.A.P.G.

SHEPARD W. LOWMAN, *chairman*

EXHIBIT X. REPORT OF GEOLOGIC NAMES AND CORRELATIONS COMMITTEE

OBJECTIVES

In the March, 1947, annual report of this committee the main objectives sought by a reorganization along geographical lines were announced as follows:

(1) the creation of a committee which would adequately and systematically cover the field of geologic nomenclature and correlations, both geographically and geologically and geologically speaking;

(2) the setting up of such an administrative procedure that the burden of carrying out the necessary paper work would not be too onerous for proper performance on any one man;

(3) the establishment of routine and easy channels of communication between the local society and the committee officers and, finally

(4) the creation of a tool which would be capable of coordinating large-scale projects involving geologic names and correlations.

REALIZATION OF OBJECTIVES

General.—It was felt last year that much of the ensuing year's work would be devoted to organization problems: firstly, in getting the personnel to fill the various jobs and secondly, in establishing a routine administrative procedure. It was hoped, too, that work on some projects could be started.

The work for last year was about in line with that anticipated, except that it fell somewhat short of the aim set. The organization originally contemplated has been set up The Cenozoic, Mesozoic, Paleozoic, and Advisory and Special Projects subcommittees have chairmen and members and are functioning. The Cenozoic, Mesozoic, and Paleozoic subcommittees each have from four to five districts with co-chairmen. A good proportion of the local society study groups comprising the district organizations have been set up and are functioning. Projects have been formulated which involve a number of districts, and work is in progress on several of these with the first phase of one large job nearing completion.

However, some of the local societies comprising the districts have not appointed study groups, some have done nothing since organization and, on the projects under way, some societies are working well and others only half-heartedly. This spotty condition of progress is due to several causes, as follows.

(1) Lack of interest on the part of the societies. My feeling here is that in the places where this condition seems to prevail it is due more to inertia on the part of committee officers than to lack of interest on the part of the societies. In some instances, however, the organizational work has simply not reached that far.

(2) The chain communication system is not working smoothly. This condition is due partly to the fact that the routine is not completely established, partly because local society representatives have not been appointed in all of the societies, partly because of inertia on the part of various people concerned, and partly due to the fact that the plan of organization is not fully understood and thus not followed.

The remedies for the foregoing conditions are rather obvious and would comprise:

(1) renewed and more vigorous effort on the part of the committee officers in completing the organization in its final detail and in working up suitable projects;

(2) more personal contact of committee officers with the societies;

(3) some shifting and change of personnel.

CENOZOIC SUBCOMMITTEE

Pacific Section.—Chairman Eckis reports that the pressure of corporation business has been so great that he has been unable to push the Cenozoic subcommittee work on the Pacific Coast. He is attempting to initiate Cenozoic projects in the various sedimentary basins in that area.

Rocky Mountains and Great Plains.—H. A. Tourtelot completed the organization of his district this year and appointed representatives in the Alberta Association of Petroleum Geologists, Kansas Geological Society, Wyoming Geological Association, and

Yellowstone-Bighorn Research Association. These representatives have been urged to consider and initiate Cenozoic projects in their societies and to assist in developing a single project, or coordinated projects, that would be acceptable to all the societies and that could be approached on a regional scale.

The Alberta Society is working on a symposium on the stratigraphy of Alberta. Two papers in this symposium will discuss Cenozoic strata.

The Kansas Society's Cenozoic committee is cooperating with the Mesozoic and Paleozoic groups in the preparation of cross sections, some of which will include Cenozoic formations.

The Wyoming Association is working on a compilation of Cenozoic data on Wyoming. The general plan of attack is one that probably can be expanded to a regional scale. It would include the name, distribution, type locality, type reference, lithology (description and facies), age, physical relationship, and other pertinent data concerning each Cenozoic formation or lithologic unit in the state.

No committee or organized program exists in the Rocky Mountain Association.

The members of the Yellowstone-Bighorn Research Association are widely scattered and their group probably will not initiate a project of its own. However, F. B. Van Houten has expressed a willingness to cooperate with other society projects in any way possible.

Western Gulf Coast.—P. H. Jennings completed organization of his district with the appointement of representatives for the various societies. Study groups have been organized in some of the societies and plans are under way for their organization in the remainder. Cross sections are being constructed in various areas and it is proposed to tie these into the larger regional sections.

Eastern Gulf Coast.—The Mississippi Society has outlined tentative dip and strike sections and has commenced sample and paleontological studies of the well samples involved. The Cenozoic group also is cooperating in the preparation of data for a Cenozoic (Tertiary) field trip in June, 1948.

The New Orleans Society is developing plans for cross sections. In order to facilitate these plans and to assist in outlining the sections they are sponsoring a Cenozoic symposium on May 14, 1948, at 2:30 P.M. in the Jackson Room of the St. Charles Hotel. All interested parties are urged to be present.

Atlantic Coast.—R. O. Vernon reports that Horace G. Richards is completing a preliminary section of the Cenozoic rocks down the Atlantic Coast area into Georgia. This section will be combined with those of S. M. Herrick in Georgia. Cross sections are planned for Florida and Alabama and work will be commenced on these in the near future.

MESOZOIC SUBCOMMITTEE

The reorganization of the subcommittee along geographic lines is fairly well completed. Horace G. Richards of the Philadelphia Academy of Sciences is co-chairman for the Atlantic Coast division and has had one conference in Tallahassee, Florida, with the members of the Southeastern Geological Society there. Richards is expanding his studies of the Mesozoic along the East Coast in cooperation with the New York and Tallahassee societies. He is having increasing difficulties in his cross-section project due to the deemphasis of activities by major oil companies along the East Coast. He hopes to have a cross section of the Mesozoic along the East Coast completed and ready for publication some time in 1949. The success of his part of the project will depend largely on the cooperation of the two societies involved as well as that of some of the major companies.

R. T. Hazzard, co-chairman for the Gulf Coast geographic group, has recently resigned due to pressure of other work. The Tallahassee study group, with E. H. Rainwater at its head, is making good progress on the multiple problems of correlation and nomenclature of the Alabama and Florida portion of the Gulf Coast section. It has not yet reached the stage where it can be tied in with the East Coast section or the Jackson society section

across northwest Alabama and Mississippi. The Jackson, Mississippi, group has made considerable progress on its portion of the Mesozoic section and has drafted a section which is not yet tied across into the Tallahassee or Shreveport portions of the section. There are a great many problems of useage and subdivisions of the Mesozoic beds from one part of this section to the next which require time and more conferences to "iron out."

The Shreveport part of the section is ready for publication as soon as difficulties of correlating with Mississippi and with East Texas are overcome. The East Texas part of the section is also well advanced, under the direction of C. I. Alexander. We have not had a report about the progress of the San Antonio part of the section for some time.

The Rocky Mountain and Great Plains geographic division, under the co-chairmanship of Ross L. Heaton, is making good progress in arousing the interest of the local societies in Mesozoic studies in that part of the country. J. D. Weir of Calgary, Canada, and Charles S. Lavington of Denver, Colorado, have been appointed local chairmen for western Canada and Wyoming, respectively, and it is believed these groups will be able to report good progress at the Denver meeting.

PALEOZOIC SUBCOMMITTEE

Rocky Mountain and Great Plains District.—No progress report on the year's activities of this committee has been received.

Mid-Continent District.—No progress report on this committee's work for the year has been received at the time of going to press. However, it is known that the societies in this district are engaged on a project whose first stage involves the construction of several east-west and north-south sections.

Eastern Interior District.—The committee is working on a geologic cross section of Paleozoic rocks extending from northern Michigan through Michigan, Indiana, Illinois, Kentucky, and Tennessee, into northern Mississippi. It is proposed to prepare the drawing to a vertical scale of 1 inch equals 300 feet and a horizontal scale of 1 to 500,000. A description of the stratigraphy will accompany it. The cross section will represent a distance of about 1,100 miles and will cross or extend into three major basins where the thicknesses of sediments are estimated to be near or more than 12,000 feet.

It is expected that the Michigan portion will be finished early in June. Work on the other parts is proceeding more slowly and completion dates are not yet anticipated.

ADVISORY AND SPECIAL PROJECTS COMMITTEE

This committee acted as consultants on various matters and, in addition, completed and reported on two projects that had been assigned to it.

The first of these projects was the preparation of a set of instructions for the preparation of cross sections by groups working on geologic names and correlations committee sponsored projects.

The second was the preparation of a set of graphic symbols for the showing of lithology on cross sections.

Miscellaneous.—The writer attended the Biloxi, the San Antonio, and the St. Louis regional meetings. Conferences on committee work were held at each of these.

Some help was extended H. G. Richards in getting the cooperation of the oil companies toward setting up the Philadelphia Academy of Natural Sciences as a repository of well samples and other material from the Atlantic Coast.

HENRY J. MORGAN, JR., *chairman*

EXHIBIT XI. COMMITTEE ON APPLICATIONS OF GEOLOGY

1. The *Directory of Films and Slides of Possible Interest to Geologists*, prepared by the committee, has been submitted to the executive committee. It is recommended that it be published.

2. Attempts to produce a sample "air log" have failed for want of the estimated $1,800 necessary. Many believe that we should devote our energies to promoting highway logs. Perhaps eventually both types of logs will be available. This unfinished business is referred to the succeeding committee.

3. The speaker's panel project has been turned over to the local societies for administration. It is possible that nearly as many talks are being given before lay groups by geologists this year as were the year before.

4. Appended are two recommendations of the committee submitted by R. A. Stehr who served as acting chairman during the committee meeting on April 26, 1948.

KENNETH K. LANDES, *chairman*

Ed. W. Owen presented a digest of "The Geologist in Uniform: World War II," a paper by David M. Delo, Chief, Scientific Manpower Section, United States Army.

After considerable discussion the following resolution proposed by Owen, was adopted and is presented to the executive committee.

The committee on applications of geology recommends to the A.A.P.G. executive committee that the national service committee be reactivated at once with a membership of 12 to discuss and promote cooperation between the Association and appropriate Government agencies concerned with the utilization of technical manpower in time of national emergency.

Charles H. Behre, Jr., chairman of the committee on advisory pamphlet for geology students, for the National Research Council Division of Geology and Geography, proposed to the committee the following resolution, which was discussed and affirmatively voted upon.

That the committee on applications of geology recommend to the executive committee of the A.A.P.G., that the Association underwrite the financing of the advisory pamphlet for geology students as set out in *Appendix B* and *Exhibit 1 of Appendix B* attached hereto, prepared by the National Research Council committee. The expense of financing this project is estimated as $3,000–$5,000.

R. A. STEHR, *acting chairman*

APPENDIX B

NATIONAL RESEARCH COUNCIL
DIVISION OF GEOLOGY AND GEOGRAPHY

COMMITTEE ON ADVISORY PAMPHLET FOR GEOLOGY STUDENTS
April, 1947

It will be recalled that a fairly detailed pamphlet on Geology as a Profession was written by Miss Ann R. Taylor, and was published in 1946 under the auspices of the U. S. Employment Service, Department of Labor. Your present committee undertook the preparation of a leaflet, less detailed in its treatment of opportunities, compensation, and nature of work, and of smaller size, to be distributed directly to students. In this pamphlet we sought to describe geology as a profession in terms sufficiently attractive yet truthful so that young men and women who might be suited for this profession by taste, temperament, and ability would examine it carefully before entering another, competing field. The attached pages are the proposed text, which will fill from 2 to 4 printed pages.

We advise that this text be printed, suitably illustrated with from 4 to 6 half-tone photographs (1 or 2 additional pages) which will show geologists at work, as well as striking or representative geological features (e.g., Paricutin in action, zigzag folds in mountain chains, and the like). Such illustrations will be obtained by your committee if the plan for publication is approved.

It is estimated that the cost per pamphlet will be between 3 and 7 cents if large numbers are run off. A desirable number would be about 50,000—more than enough, we estimate, to send one to each 4-year high school in the nation.

Preliminary assurance of publication has been given by at least three mediums—the Geological Society of America, the American Institute of Mining and Metallurgical Engineers, and the Engineering and Mining Journal (which recently published "Take a look at mining"—similar advice to potential mining engineers). Any of these organizations would furnish reprints (or preprints) at cost. Probably the Geological Society of America is best adapted for this undertaking by purpose, funds, and standing, and also could serve best as distributing agent. Other possible support or execution might be obtained through the American Council of Learned Societies and the National Education

Association. We believe that there should be incorporated in the title of this otherwise anonymous pamphlet the statement that it was prepared under the auspices of the National Research Council.

Your committee will gladly, with such modifications as seem desirable, undertake the closing steps in the above plan, if it is duly instructed and such action is authorized by the Division of the National Research Council. Its task being essentially completed, your committee requests that it be discharged either now or immediately upon completion of this plan, not later than October 31, 1947, and preferably by July 1, 1947.

DON CARROLL, LOUIS RAY, CHAS. H. BEHRE, JR., *chairman*

EXHIBIT 1 OF APPENDIX B*

CAREERS IN GEOLOGY

PREPARED AND PUBLISHED UNDER THE AUSPICES
OF
THE DIVISION OF GEOLOGY AND GEOGRAPHY, NATIONAL RESEARCH COUNCIL

The choice of a profession is a serious problem for a young man or woman. It is a choice which generally must be made at the time of finishing high school. At that time especially it may involve a decision regarding college or university training. The success of a career is probably best measured by the pleasure derived from the environment, whether urban or rural; by enjoyment of ones associates; and by the gratification and happiness that come from living a useful life. In order to achieve a successful career a young man or woman should select that profession which, as nearly as he can anticipate, will fit his own preferences as to the physical and human setting, preserve his ideals and enthusiasms, and best suit his natural talent and temperament.

Those who are attracted by the possibility of a career in pure or applied science should give thoughtful consideration to the practice of geology as a profession. Geology combines parts of the other natural sciences. But it is also a field in its own right, offering its own specialties while utilizing the physical and biological sciences to help in the solution of its problems.

Geology deals especially with an understanding of the earth, the planet on which we dwell. The geologist is called upon to study the composition of minerals and rocks and must learn to distinguish them; to recognize fossils and reconstruct the ancient life—the huge swimming reptiles, the dinosaurs, toothed birds, and great coal ferns that inhabited the by-gone seas and lands; to determine the courses of ancient streams and mountain chains, the boundaries of great seas that once stood where there is now land; and to find and interpret records of the climates of long ago, often strikingly at variance with those of today—like the warm climate in which magnolias thrived in Greenland or the glacial ages in which wooly elephants roamed the United States. In brief, it is the geologist who must decipher the complex story of the earth's past and who may peer, however hesitantly, into its future. These can be called the basic, purely scientific and at times philosophical sides of geology.

The geologist can apply his special training and experience to practical subjects and problems as well. His is the key position in the discovery of deposits of the many mineral substances required by our highly industrialized civilization. He plans and executes campaigns in the never-ending search for new oil fields, for previously untouched sources of ores, for undeveloped concentrations of salt and sulphur, of gemstones and coal, of pottery clays and building stone that are needed for special purposes all over the world. As more and more deposits, especially those at or near the surface, are found and exploited, the search becomes increasingly intensive and difficult, the geologist more valuable and more highly trained. Geologists are likewise asked by engineers to determine where dams may be built without leakage, where the foundations of great buildings and bridges may be safely placed, and where water wells may be drilled with success. During the war they advised on gun emplacement, the water supply of troops, the nature of shores on which landings had to be made from the sea, and the source of strategically important war minerals. Today, in consequence, trained geologists are in greater demand than ever before, in private mineral industries and as public servants in federal and state geological surveys and other government agencies.

Geology is so broad a field of work and is related to so many other sciences—physics, mathematics, and chemistry, astronomy, botany, and zoology, and even such technical subjects as mining and civil engineering and soil mechanics—that the geology student can no longer expect to acquire more than the fundamental principles of the subject during his earlier college years. Sooner or later he must choose a special field of endeavour from the broad scope of geology, according to his greatest supplementary interest.

If he is attracted by physics as a supplementary interest, he may be trained as a geophysicist and devote his efforts to solving the riddles of earthquake waves and measuring the earth's gravity and magnetism. This knowledge can be used to help understand what kind of material is deep under the continents, and how molten rock reaches the earth's surface to form volcanoes. On the other hand, these same general methods may serve to locate buried petroleum reserves or ore deposits. At present there is a special need for scientists trained in geophysics.

* Preliminary edition.

If the young geologist decides to become a geochemist, he may "get in on the ground floor," perhaps, of a fascinating new field dealing with the origin and exploration of deep mineral deposits for which there is no evidence at the surface. Geochemists also study the nature of molten lavas above or beneath the earth's surface. Some are concerned primarily with the relations between putrefying animal and plant remains and the origin of the great mineral fuels, oil and coal; this branch of geochemistry verges on organic chemistry.

Geology students may also lean toward the biologic sciences as subsidiary interests. Here geology supplies an outlet in the special fields of paleontology and paleobotany. These phases are concerned with the description and classification of earlier animals and plants and the broader laws of evolution governing their development. By the application of biologic principles, the geologist establishes the orderly sequence of strata, the older ones below and the younger ones above. Where the strata have been tilted, folded, overturned, or otherwise contorted, recognition of such facts has a direct bearing on mineral exploration, or in drilling for oil. Thus, in its biologic aspects, much as in its other phases, geology has both a purely scientific and a more practical value, just as it does in geophysics, geochemistry, and mining geology. This is also true of the study of minerals (mineralogy), of rocks (petrology), of ancient land forms (geomorphology), and of the arrangement and deformation of rock masses or strata (structural geology).

Geologists occupy important positions on the staffs of colleges, universities, and schools of engineering and agriculture, where by their teaching and study of special geological problems they pioneer on the frontiers of knowledge in science and train future generations in their specialty. Many more, however, are employees of state and federal agencies which map the country to show the configuration of the surface (topography), the rocks that appear at that surface (areal geology), and the probable position of such rocks at depth, as an aid in mining activity, engineering construction, farming, and military operations. Many more geologists are employed directly by the mining, petroleum, and other mineral industries. In the United States the petroleum companies employ some 6,000 out of a total of about 10,000 professional geologists, including a number of women.

With such work go commensurate rewards in the way of salaries, social prestige, and professional recognition, comparable in every way to those attained in other professions. After a well designed 4-year course in a college, university or engineering school, the young man or woman may expect a fair beginning salary (for example, in 1947 $200–300 per month), the higher figures being more typical for appointments in foreign fields, the lower for positions in the United States. A preferable training includes 5–7 years of undergraduate and post-graduate engineering school, college, or university work, carefully planned to include geology, certain other basic sciences (especially mathematics, chemistry, physics, and biology), modern languages, and perhaps related engineering subjects. This usually leads to an M.S. or M.A. degree (5 years) or a Ph.D. (7 years) in geology. Beginning salaries commanded by those holding the higher degrees average about $250–350 per month in 1947, but men with experience generally receive appreciably higher salaries than newcomers in the profession. During field work the employer furnishes living and travel expenses. Until recently women have been employed chiefly in mineralogic and paleontologic laboratories, as executives and teachers. For them the salaries average slightly less. Upper ranges of professional standing and of income extend all the way up to those of deanships and presidencies in colleges and universities, directorships and positions as state geologists in public service agencies, and appointments as chief geologists, general managers and vice presidents of large oil or mining companies. Not to be overlooked are numerous consultants who are part-time employees of industry in a profession which, if successfully practiced, is at once useful, interesting and remunerative.

One aspect of geology should be mentioned as perhaps its greatest asset, though it may be classed by many as intangible or even as a liability. Some jobs in geology include real physical hardships, such as work in the humid tropics or the rugged back-country of Asia or the high Andes. This is an asset or liability, according to the temperament of the person concerned. Many geologists, indeed, lead something of a gypsy-like existence for appreciable parts of their lives. As the geologist thus enjoys an outdoor life which is healthy and hardy, the compensation in that enjoyment itself as large. For the nature lover, the out-door pursuit of the science provides all he could wish. For the geologist, as for the mining engineer, the physical interest and exhilaration afforded by the most varied landscapes goes with a most exceptional opportunity to see the peoples and cultures of the world—the austerity and dignity of Saudi Arabs, the squat simplicity of the Eskimos on the northern shores of Alaska, the curious and venerable arts of Siam, the colorful, sad-faced Indians of the high Andes in Peru. It may be aptly said, to paraphrase a well-known slogan, "Join the geologists and see the world." These opportunities hold out a stimulating prospect to the student, an exciting, broadening scientific career, and a delightful fund of colorful recollections.

Exhibit XII. Report of Medal Award Committee

Arville I. Levorsen, dean of the School of Mineral Sciences at Stanford University, and past-president of the American Association of Petroleum Geologists and the Geological

Society of America, was chosen unanimously by the medal award committee to receive the Sidney Powers Memorial Medal Award of the Association for distinguished and outstanding contributions to, and achievements in, petroleum geology as a field geologist, executive, researcher, teacher, and counselor. Presentation was made at the opening session of the 33d annual meeting of the Association in Denver, Tuesday, April 27, 1948.

Laurence L. Sloss, professor of geology, Northwestern University, and W. M. Laird, State geologist, North Dakota, were chosen by the medal award committee to receive the President's Award for 1947, for their joint paper on "Devonian System in Central and Northwestern Montana," which appeared in the August, 1947, *Bulletin*. Nineteen authors under 35 years of age on January 1, 1947, published papers in the *Bulletin* during 1947 and were eigible for this award. The award, consisting of $50 each in cash, and citations, was presented at the opening session of the 33d annual meeting in Denver.

Thanks are herewith extended to the members of the committee for their splendid cooperation.

CARROLL E. DOBBIN, *chairman*

EXHIBIT XIII. REPORT OF COMMITTEE ON STATISTICS OF EXPLORATORY DRILLING

The committee on statistics of exploratory drilling, numbering 23 members, and the subcommittees appointed locally by members of the main committee to assist them, successfully and efficiently accomplished their work of gathering and compiling data on the exploratory drilling of 1947. These data were sent to the chairman for final analysis as the basis for the annual report which, as in former years, will be printed in the June number the *Bulletin*.

Each year we receive many indications, both written and spoken, that the statistics prepared by this committee are of increasing value, not only to geologists and geophysicists but also to managements of oil companies, to banks, to colleges, and to Government organizations such as the Bureau of Mines and the United States Geological Survey. It should be a satisfaction to members of this committee and to the Association that the results of this rather arduous work more and more are being accepted as standard and as the most reliable figures available on exploratory drilling.

FREDERIC H. LAHEE, *chairman*

EXHIBIT XIV. REPORT OF DISTINGUISHED LECTURE COMMITTEE, 1947–48 SEASON

The distinguished lecture committee wishes to express its appreciation to the following speakers who have made possible the completion of another successful year.

E. DeGolyer	Dallas, Texas
Raymond C. Moore	Kansas Geological Survey
Marland P. Billings	Harvard University
Clark Goodman	Massachusetts Institute of Technology
A. I. Levorsen	Stanford University
Gordon Rittenhouse	University of Cincinnati
John W. Huddle	University of North Carolina

Through the selection of these men, we have been able to present a diversified and stimulating group of subjects. This is in line with the purpose of the committee.

During this season the committee has sponsored seven speakers who have presented 107 lectures, arranged for 39 geological groups. This corresponds with 120 lectures before 35 separate groups during the 1946–47 season. Four new groups have participated in these lectures for the first time,—these are Abilene Geological Society, Kansas University, Northern California Geological Society, and the New Mexico Geological Society. All scheduled appearances have been filled. Of the 39 geological organizations included this year, 26 are affiliated, the others are related groups.

By placing the speakers before the 13 unaffiliated groups and reducing the distance

travelled between talks, the cost of each individual tour was held to a minimum. It is becoming increasingly difficult to hold costs of these tours down to a figure which will enable the smaller groups to invite the number of speakers desired. In spite of the increased expense of travel, the average cost of each lecture was $30.36, an increase of only 36 cents above the preceding year. We feel that this is a noteworthy record.

This work is being carried on through a $1,500 revolving fund from the Association, and it is recommended that the sum remain the same for the coming year.

The committee wishes to express its thanks to the local societies which have cooperated so closely in making this a successful season.

FRED H. MOORE, *chairman*

EXHIBIT XV. REPORT OF COMMITTEE ON BOY SCOUTS LITERATURE

Following the suggestion made by the committee at the Los Angeles annual meeting on March 24, 1947, the membership of this committee was enlarged. Meetings of part of the membership of the committee were held in Los Angeles during the 32d annual meeting, at Cody, Wyoming, in early August and in San Antonio at the regional meeting in early November. In addition there was an exchange of ideas between the members of the committee by correspondence throughout the 1947–1948 Association year.

We have had enough correspondence with members of the headquarters staff of the Boy Scouts of America to lead us to believe that when we are prepared to submit suggested Merit Badge pamphlets on Geology and Physiography they will be given serious consideration. The same staff realize now that the unpopularity of the present Merit Badge on Rocks and Minerals is because it is difficult and unattractive to boys rather than the subject being of minor interest as they had supposed. Incidentally, the Rocks and Minerals Merit Badge was inaugurated from the standpoint of a hobby rather than an attempt to acquaint a boy with a profession. Most Boy Scouts who pass the requirements for this Merit Badge never know it has anything to do with geology.

The committee has decided that the present need is for one basic elementary Merit Badge on Geology and one on Physiography. These to be written for the 13 year old boy—just as the other Merit Badges for Boy Scouts are written. It is planned to write up the pamphlets for these Merit Badges in an interesting and fascinating style with catchy illustrations. In view of the fact that the Senior Scout program—boys 15 through 18 years of age—is becoming increasingly more important, it is planned to work up Merit Badges for Senior Scouts in more advanced geologic subjects.

Early in the Association year it was learned that the authorities at the Philmont Scout Ranch at Cimarron, New Mexico, were very desirous of inaugurating a geology program for their summer work in 1948. This ranch is the 130,000 acre tract of land which Waite Phillips gave the Boy Scouts of America. With the ranch went several millions of dollars worth of buildings, livestock and equipment. It is used by the Boy Scouts of America for selected Senior Scouts from all over America where they are given two weeks of intensive training with emphasis on the profession they think they would like to take up when they go to college. The several thousand young men who take the training each summer probably represent the upper ten percent of the youth of America in both mental and physical fitness. Since the ranch itself is a geological paradise your committee jumped at this opportunity. The immediate benefits to the geological profession will be in interesting the top youth of the country in geology as a profession. The main benefit for our committee work will be in testing our ideas for Merit Badges in the field so that we may finally come up with Merit Badge pamphlets which we know will work. Professor Ray L. Six of Oklahoma A & M will have charge of the geology program at Philmont this summer.

George Pirtle suggested that it would be an excellent idea for local geological societies to work up the simple geology and physiography of Boy Scout council camps in their

locality. This would have a two-fold purpose of providing an additional program for Scouts in summer camps which would be very interesting to the boys, and of getting an idea of what a Boy Scout anywhere in the country could be expected to find in his locality in the way of geology and physiography. This would then give the committee an average upon which to base the requirements for a Merit Badge so that any boy anywhere could pass the tests and learn something about the subjects. The New York office of the Boy Scouts of America was enthusiastic about this idea and suggested several council camps over the country they would like to see worked up. At this writing several of the affiliated societies have agreed to work up the council camps in their vicinity this year.

R. C. Spivey, Ray L. Six, Berte R. Haigh, and Martin Van Couvering are working up the Geology Merit Badge Pamphlet, which will be edited by Don L. Carroll. Chalmer L. Cooper, Russell M. Tripp, and W. T. Thom, Jr., are taking care of the aerial photography in relation to the geology and physiography of all Boy Scout camps covered. George W. Pirtle, M. G. Cheney, and George Buchanan are in charge of the work of the local societies working up council camps. Frank Gouin, Ray L. Six, and W. T. Thom, Jr., are in charge of the Philmont Senior Scout Ranch project. A. C. Bace and E. C. Dapples have the project of the selection of films and slides appropriate for illustrative purposes. And Max W. Ball, Hal P. Bybee, and Carey Croneis are to supervise the illustrations and drawings to go in the pamphlets. All members of the committee have been called on for suggestions and all are ex-officio members of the sub-committees aforelisted. It is the hope of the committee that many members of the Association will send suggestions they may have.

In spite of the fact that there has never been a time when geologists are so busy on their own duties, this committee feels that by the end of the 1948–1949 Association year the major part of the business which is expected to be done by your committee will have been accomplished.

FRANK GOUIN, *chairman*

EXHIBIT XVI. REPORT OF COMMITTEE ON EDUCATION

The committee on education was instructed to keep in touch with other societies studying geological education and to submit a summary report. This committee has closely followed the related activities of other organizations, has at this convention met jointly with the education committees of the Geological Society of America and the Society of Exploration Geophysicists, and wishes to report as follows.

The most important study carried to completion during the past year was that of the "Committee on Geologic Education, Division of Geology and Geography, National Research Council" under the chairmanship of C. R. Longwell. In the open-forum discussions and deliberations of this committee, representatives of the American Association of Petroleum Geologists, the Society of Exploration Geophysicists, the American Association for the Advancement of Science, the Geological Society of America, the Association of Geology Teachers, and the public, have from time to time participated. The Longwell committee has now issued its final report (see *Interim Proceedings*, G.S.A., Pt. 3, August, 1947; also summary statement of conclusions reached, *Science*, March 19, 1948). Also, a very pertinent and fruitful discussion took place in Ottawa in December under the auspices of the Geological Society of America, at the "Joint Conference of the Geological Society of America, Committee on Geologic Education, and the Association of Geology Teachers" (see *Interim Proceedings*, G.S.A., Pt. 2, March, 1948).

The conclusions developed during this series of meetings, and particularly those recorded in the final report of the Longwell committee, constitute the results of the most comprehensive study of geologic education since the findings of the Lahee committee were published (see A.A.P.G. *Bulletin*, Vol. 25, May, 1941; also, Vol. 26, May, 1942). Your

committee last year endorsed the recommendations of the Lahee committee. Your present committee wishes to call attention to and make further recommendations regarding the conclusions reached as a result of the more recent discussions.

1. We endorse in general the findings of the Longwell committee, and we recommend their careful study by students and educators, as well as by members and employers of the geological profession generally.

2. We place special emphasis on the conclusion that "more basic science, particularly mathematics, physics, chemistry, and biology as an essential foundation for understanding and developing geologic principles"—or equivalent training in engineering—is an outstanding need in the educational program. To this we would add our conviction that this requirement should, where necessary, take precedence over such courses in geology as those dealing in specialized techniques rather than fundamentals. In short, the emphasis in any curriculum should be on fundamentals.

3. We wish also specifically to endorse the conclusion that revision of teaching techniques "toward methods that will incite scientific curiosity and develop habits of original and more rigorous thinking" is another outstanding need. We believe that one of the most important functions in teaching is that of developing the students' ability to reason. In some curricula such a revision in teaching practice may require reducing the number of purely factual courses in geology in order to make room for development of the reasoning powers.

4. We concur in the opinion of the Longwell committee that the science of geology has a great and as yet not fully appreciated value "as a discipline for inculcating the scientific method." In fact, your committee feels that instruction in geology offers a field second to none for developing this discipline, and that the responsibility of the teaching profession in this regard is a heavy one. It includes training in the use of deductive and inductive reasoning; in the method of multiple working hypothesis; in the ability to maintain an open mind. This training can bring out the real value of the "scientific method" as a practical tool, as the only sound approach to all geologic problems as well as to problems in more general fields.

5. We would propose that no undergraduate training in geology should be considered as complete without an adequate field course.

6. As to further details regarding curricula we would refer teachers and students to the specific suggestions embodied in the reports of the Lahee and the Longwell committees afore cited; and call attention to the report and curriculum prepared for George Washington University by a committee of Geological Survey geologists which "represents a composite opinion—as to what constitutes a desirable training for the work of The Geological Survey" (see W. H. Bradley, "A Suggested Geological Curriculum," *Interim Proceedings*, G.S.A., Pt. 2, April 1947).

7. Your committee recommends that authorization be granted for the use of the *Bulletin* as a medium for discussion of educational problems insofar as this use is consistent with the major purposes of the *Bulletin*, and suggests that contributions of this character be carried under a continuing section labeled "Geologic Education" in a manner similar to "Research Notes" or "Reviews and New Publications."

8. Accrediting Schools: We endorse the majority sentiments expressed in the "Joint Conference of the Geological Society of America Committee on Education and the Association of Geology Teachers" at Ottawa, as well as the conclusion of the Longwell committee, against any present attempts at further accreditation of schools.

9. The representatives of the three societies participating in the Denver discussions joined in the opinion, and your committee therefore recommends, that a continuing committee on geologic education should be appointed to act as liaison between the A.A.P.G. and other organizations active in this field, to keep in touch with the evolution of educational procedures in colleges and universities, to make appropriate recommendations to

the Association from time to time, and to sponsor the section in the ***Bulletin*** on Geologic Education.

ROY R. MORSE, *chairman*

MINUTES OF BUSINESS COMMITTEE, DENVER, COLORADO
APRIL 26, 1948

The annual business committee meeting was called to order in the Shirley-Savoy Hotel, Denver, Colorado, April 26, 1948, 9:45 A.M., by Theodore A. Link, chairman.

1. *Roll call.*—Roll call by secretary J. V. Howell showed the following members and alternates present.

Chairman: Theodore A. Link *Co-chairman:* Ben H. Parker *Secretary:* J. V. Howell
Executive committee: C. E. Dobbin, J. V. Howell, Earl B. Noble, George S. Buchanan, C. L. Moody
Members-at-large: Roy M. Barnes, Ira H. Cram, Henry A. Ley, D. D. Utterback, Paul Weaver

Division	*Representatives*	*Alternates*
Paleontology	James A. Waters	
	Henryk B. Stenzel	
Districts		
Amarillo	Elisha A. Paschal	
Appalachian	Fenton H. Finn	
Canada	C. S. Corbett (absent)	
Capital	Carle H. Dane	
Corpus Christi	O. G. McClain	
Dallas	W. Dow Hamm (absent)	
	Joseph M. Wilson (absent)	John W. Clark
East Oklahoma	Frank R. Clark (absent)	R. A. Brant
	Robert L. Kidd	
	E. Floyd Miller	
	Sam H. Woods (absent)	
Fort Worth	Lynn K. Lee	
Great Lakes	Stanley G. Elder	
	E. E. Rehn	
Houston	Ira H. Brinkerhoff	
	Shirley L. Mason (absent)	
	Olin G. Bell	
	Charles L. Lake (absent)	
	Harry C. Spoor, Jr. (absent)	
	Harold L. Geis	
Michigan	Charles K. Clark	
New Mexico	R. L. Boss	
New York	G. M. Knebel	
	Hollis D. Hedberg (absent)	
Pacific Coast	Frank W. Bell (absent)	
	Claude E. Leach	
	D. E. Taylor (absent)	
	Gordon R. Bell	
	W. S. W. Kew	
	L. W. Saunders	
Rocky Mountain	H. E. Christensen	
	A. F. Barrett	
	E. J. Boos	
Shreveport	B. W. Blanpied (absent)	C. L. Bryan
South America	H. G. Kugler (absent)	
	J. M. Patterson (absent)	
Southeast Gulf	Henry N. Toler	
Southern Louisiana	J. W. Hoover (absent)	
South Permian Basin	Warren D. Anderson (absent)	John M. Mills
	F. H. McGuigan	
	V. C. Perini, Jr.	
South Texas	Robert N. Kolm	
	George H. Coates	
Tyler	C. I. Alexander	

West Oklahoma	C. W. Tomlinson
	J. T. Richards
Wichita	F. G. Holl
Wichita Falls	J. J. Russell, Jr.

2. *Seating of representatives.*—It was moved, seconded, and carried that members of the business committee not present at roll call be recorded by the secretary if they report to him at the close of the session.

3. *Minutes of previous meeting.*—It was moved, seconded, and carried that the reading of the minutes of the last meeting of the committee be dispensed with, as they have been published in the *Bulletin.*

4. *Reading of reports of standing and special committees.*—The following reports were read.

1. Division of Geology and Geography, National Research Council, Philip B. King, chairman (read by C. E. Dobbin)
2. American Commission on Stratigraphic Nomenclature, Monroe G. Cheney, chairman
3. Committee for publication, Lynn K. Lee, chairman
4. Research committee, Shepard W. Lowman, chairman
5. Geologic names and correlations committee, Henry J. Morgan, chairman
6. Medal award committee, C. E. Dobbin, chairman
7. Distinguished lecture committee, Fred H. Moore, chairman
8. Committee on Boy Scouts literature, Frank Gouin, chairman
9. Committee on applications of geology, Kenneth K. Landes, chairman
10. Education committee, Roy R. Morse, chairman
11. Committee on statistics of exploratory drilling, Frederic H. Lahee, chairman

5. *Research committee.*—It was moved, seconded, and carried that the committee express its thanks to S. W. Lowman for his fine work as chairman of the research committee.

6. *Committee on applications of geology. Directory of Films and Slides.*—It was moved, seconded, and carried that it be recommended to the executive committee that the *Directory of Films and Slides*, prepared by the committee on applications of geology, K. K. Landes, chairman, be published either separately or in the *Bulletin*, or both.

7. *Preservation of cores and cuttings.*—It was moved, seconded, and carried that it be recommended to the executive committee to appoint a special committee to study the preservation of cores and cuttings, including the costs involved and the most central places for core museums or libraries, and that the committee have representatives from the stratigraphic committee and from the research committee.

8. *American Geological Institute.*—It was moved, seconded, and carried that the business committee approve the recommendation of the executive committee to recommend to the Association in annual meeting to adopt the articles of organization of the American Geological Institute which have been amended to permit the affiliation of the Institute with the National Research Council.

9. *Reports of standing and special committees.*—It was moved, seconded, and carried that the reports of the standing and special committees be accepted and referred to the annual meeting with the recommendation that they be not read but that they be published in the *Bulletin.*

THEO. A. LINK, *chairman* BEN H. PARKER, *co-chairman* J. V. HOWELL, *secretary*

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS

CONSTITUTION[1]

ARTICLE I. NAME

This Association shall be called "The American Association of Petroleum Geologists," incorporated under the laws of Colorado.

ARTICLE II. OBJECT

The object of this Association is to promote the science of geology, especially as it relates to petroleum and natural gas; to promote the technology of petroleum and natural gas and to encourage improvements in the methods of exploring for and exploiting these substances; to foster the spirit of scientific research amongst its members; to disseminate facts relating to the geology and technology of petroleum and natural gas.

ARTICLE III. MEMBERSHIP

Members

SECTION 1. Any person engaged in the work of petroleum geology or in research pertaining to petroleum geology or technology is eligible to active membership, provided he is a graduate of an institution of collegiate standing, in which institution he has done his major work in geology, or in sciences fundamental to petroleum geology, and in addition has had the equivalent of three years' experience in petroleum geology or in the application of these other sciences to petroleum geology or to research in petroleum geology or technology; and provided further that in the case of an applicant for membership who has not had the required collegiate or university training, but whose standing in the profession is well recognized, he shall be admitted to membership when his application shall have been favorably and unanimously acted upon by the executive committee; and provided further that these requirements shall not be construed to exclude teachers and research workers in recognized institutions, whose work is of such character as in the opinion of the executive committee shall qualify them for membership.

Active members alone shall be known as members.

Life Members

SECTION 2. The executive committee may grant life membership to members who have paid their dues and are otherwise qualified.

Associates

SECTION 3. Any person having completed as much as thirty hours of geology (an hour shall here be interpreted as meaning as much as sixteen recitation or lecture periods of one hour each, or the equivalent in laboratory) in a reputable institution of collegiate or university standing, or who has done field work equivalent to this, is eligible to associate membership, provided at the time of his application for membership he shall be engaged in geological studies in an institution of collegiate or university standing, or shall be engaged in petroleum geology; and any person who is a graduate of an institution of collegiate standing in which he has done his major work in sciences fundamental to petroleum geology or petro-

[1] The constitution and by-laws were adopted 1918, and amended 1921, 1922, 1923, 1925, 1927, 1928, 1929, 1930, 1932, 1933, 1935, 1936, 1939, 1940, 1942, 1943, 1944, 1945, and 1946.

leum technology, and who has the equivalent of one year's experience in the application of his science to the study of petroleum geology, shall be eligible to associate membership, provided at the time of his application for membership he shall be engaged in investigations in the broader subject of petroleum geology and technology.

Associate members shall be known as associates.

Associates shall enjoy all the privileges of membership in the Association, save that they shall not hold office, sign applications for membership, or vote; neither shall they have the privilege of advertising their affiliation with the Association in professional cards or professional reports or otherwise.

The executive committee may advance to active membership, without the formality of application for such change, those associates who have, subsequent to election, fulfilled the requirements for active membership.

Election to Membership

SECTION 4. Every candidate for admission as a member or associate shall submit a formal application on an application form authorized by the executive committee, signed by him, and endorsed by not less than three members who are in good standing, stating his training and experience and such other facts as the executive committee shall from time to time prescribe. Provided the executive committee, after due consideration, shall judge that the applicant's qualifications meet the requirements of the constitution, they shall cause to be published in the *Bulletin* the applicant's name and the names of his sponsors. If after at least thirty days have elapsed since such publication, no reason is presented why the applicant should not be admitted, he shall be deemed eligible to membership or to associate membership, as the case may be, and shall be notified of his election.

With the notice of election shall be included a copy of the constitution and by-laws of the Association.

SECTION 5. An applicant for membership, on being notified of his election in writing, shall pay full membership dues for the current year and on making such payment shall be entitled to receive the entire *Bulletin* for that year. Unless payment of dues is made within thirty (30) days by those living within the continental United States and within ninety (90) days by those living elsewhere, after notice of election has been mailed, the executive committee may rescind the election of the applicant. Upon payment of dues, each applicant for membership shall be furnished with a membership card for the current year, and until such written notice and card are received, he shall in no way be considered a member of the Association.

Honorary Members

SECTION 6. The executive committee may from time to time elect as honorary members persons who have contributed distinguished service to the cause of petroleum geology. Honorary members shall not be required to pay dues.

SECTION 7. Each member and associate shall be guided by the highest standards of business ethics, personal honor, and professional conduct.

SECTION 8. Any member or associate who, after due investigation, is found guilty of violating any of the standards of conduct prescribed in Section 7 of this Article, may be admonished, suspended, allow to resign, or dropped from membership in accordance with the procedure provided by the by-laws.

ARTICLE IV. OFFICERS AND THEIR DUTIES

Officers

SECTION 1. The officers of the Association shall be a president, a vice-president, a secretary-treasurer, and an editor. These, together with the past-president, shall constitute the executive committee and managers of the Association.

SECTION 2. The officers shall be elected annually from the Association at large by means of secret mailed ballot in the following manner. The nominating committee shall nominate one or more candidates for each office, and its nominations shall be published in the September *Bulletin*. Additional nominations may be made by written petition of fifty, or more, members in good standing received at Association headquarters not later than November 15. The executive committee shall then prepare a printed ballot, listing the candidates for each office, and one ballot shall be mailed to each member as soon after November 15 as possible. Ballots returned to Association headquarters on or before January 31 shall be placed as received in a locked ballot box and promptly after January 31 the ballot committee shall open the ballot box and count the ballots. Ballots of delinquent members shall not be counted. A majority of all votes cast for an office is necessary for election. If there are three or more nominees for any office, a preferential form of ballot shall be used. In case of a tie vote, the executive committee shall cast one additional deciding vote. Each candidate, when voted for as a candidate for the particular office for which he is nominated, shall be thereby automatically voted for as a candidate for the executive committee for one year, except that candidates for the presidency shall be automatically voted for as candidates for the executive committee for two years.

SECTION 3. No one shall hold the office of president for two consecutive years and no one shall hold any other office for more than two consecutive years except the editor who shall not hold office for more than six consecutive years.

Duties of Officers

SECTION 4. The president shall be the presiding officer at all meetings of the Association, shall take cognizance of the acts of the Association and of its officers, shall appoint such committees as are required for the purposes of the Association, except the nominating committee, and shall delegate members to represent the Association. He may, at his option, serve on, and may be chairman of, any committee, except the nominating committee.

SECTION 5. The vice-president shall assume the office of president in case of a vacancy from any cause in that office and shall assume the duties of president in case of the absence or disability of the latter. If the past-president shall for any reason be unable to serve as a member of the executive committee, the president shall fill the vacancy by the appointment of the next available preceding past-president.

A vacancy or disability occurring in the office of vice-president, secretary-treasurer, or editor shall be filled by majority vote of the executive committee, either for the unexpired term or for the period of disability, as the committee may decide. In the case of a tie, the president shall cast the deciding vote.

SECTION 6. The secretary-treasurer shall assume the duties of president in case of the absence of both the president and vice-president. He shall have charge of the financial affairs of the Association and shall annually submit reports as secretary-treasurer covering the fiscal year. He shall receive all funds of the Association, and, under the direction of the executive committee, shall disburse all funds of the Association. He shall cause an audit to be prepared annually by a public accountant at the expense of the Association. He shall give a bond, and shall cause to be bonded all employees to whom authority may be delegated to handle Association funds. The amount of such bonds shall be set by the executive committee and the expense shall be borne by the Association. The funds of the Association shall be disbursed by check as authorized by the executive committee.

SECTION 7. The editor shall be in charge of editorial business, shall submit an annual report of such business, shall have authority to solicit papers and material for the *Bulletin* and for special publications, and, with the approval of the executive committee, may accept or reject material offered for publication. He may appoint associate, regional, and special editors.

SECTION 8. The officers shall assume the duties of their respective offices immediately after the annual meeting, which follows their election.

ARTICLE V. EXECUTIVE COMMITTEE—MEETINGS AND DUTIES

Executive Committee

SECTION 1. The executive committee shall consist of the president, past-president, vice-president, secretary-treasurer, and editor.

Meetings and Duties

SECTION 2. The executive committee shall meet immediately preceding the annual meeting and at the call of the president may hold meetings when and where thought advisable, to conduct the affairs of the Association. A joint meeting of the outgoing and incoming executive committees shall be held immediately after the close of the annual Association business meeting. Members of the executive committee may vote by proxy on matters which require a unanimous vote.

SECTION 3. The executive committee shall consider all nominations for membership and pass on the qualifications of the applicants; shall have control and management of the affairs and funds of the Association; shall determine the manner of publication and pass on the material presented for publication; shall designate the place of the annual meeting; shall appoint the nominating committee and its chairman; and shall be in charge of the annual election of officers and decide eligibility and other questions pertaining to the election. They are empowered to establish a business headquarters for the Association, and to employ such persons as are needed to conduct the business of the Association. They are empowered to accept, create, and maintain special funds for publication, research, and other purposes. They are empowered to make investments of both general and special funds of the Association. Trust funds may be created, giving to the trustees appointed for such purpose, such direction as to investments as seems desirable to the executive committee to accomplish any of its objects and purposes, but no such trust funds shall be created unless they are revocable upon ninety (90) days' notice.

ARTICLE VI. MEETINGS

The Association shall hold at least one stated meeting each year, which shall be the annual meeting. The meeting shall be held in March or April at a time and place designated by the executive committee. At this meeting the election of members shall be announced, the proceedings of the preceding meeting shall be read, Association business shall be transacted, scientific papers shall be read and discussed and officers for the ensuing year shall be announced.

ARTICLE VII. AMENDMENTS

Amendments to this constitution may be proposed by a resolution of the executive committee, by a constitutional committee appointed by the president, or in writing by any ten members of the Association. All such resolutions or proposals must be submitted at the annual meeting of the business committee of the Association as provided in the by-laws, and only the business committee shall make recommendations concerning proposed constitutional changes at the annual Association business meeting. If such recommendations by the business committee shall be favorably acted on at the annual Association business meeting, the secretary-treasurer shall arrange for a ballot of the membership by mail within thirty (30) days after said annual Association business meeting, and a majority vote of the ballots received within ninety (90) days of their mailing shall be sufficient to amend. The legality of all amendments must be determined by the executive committee prior to balloting.

BY-LAWS

ARTICLE I. DUES

SECTION 1. The fiscal year of the Association shall correspond with the calendar year.

SECTION 2. The annual dues of members of the Association shall be ten dollars ($10.00). The annual dues of associates for not to exceed three years after election shall be six dollars ($6.00); for the second three-year period eight dollars ($8.00); thereafter, the annual dues of such associates shall be ten dollars ($10.00). The annual dues are payable in advance on the first day of each calendar year. A bill shall be mailed to each member and associate before December first of each year, stating the amount of the annual dues and the penalty and conditions for default in payment. Members or associates who shall fail to pay their annual dues by January first shall not receive copies of the January *Bulletin* or succeeding *Bulletins*, nor shall they be privileged to buy Association special publications at prices made to the membership, until such arrears are met.

During any period in which the United States is actually engaged in war and for a period of one year thereafter, the executive committee may at its discretion suspend, reduce, or waive annual dues to members or associate members serving in the armed forces of the United States or any allied country, without otherwise affecting their membership, except that they shall not receive the *Bulletin* during a period for which no dues are paid.

SECTION 3. On the payment of two hundred dollars ($200.00) any member in good standing shall be declared a life member and thereafter shall not be required to pay annual dues. The funds derived from this source shall be placed in a permanent investment, the income from which shall be devoted to the same purposes as the regular dues.

ARTICLE II. RESIGNATION—SUSPENSION—EXPULSION

SECTION 1. Any member or associate may resign from the Association at any time. Such resignation shall be in writing and shall be accepted by the executive committee, subject to the payment of all outstanding dues and obligations of the resigning member or associate.

SECTION 2. Any member or associate who is more than a year delinquent (in arrears) in payment of dues shall be suspended from the Association. Any delinquent or suspended member or associate, at his own option, may request in writing that he be dropped from the Association and such a request shall be granted by the executive committee. Any member of associate more than two years in arrears shall be dropped from the Association. The time of payment of delinquent dues for either one year or two years may be extended by unanimous vote of the executive committee.

SECTION 3. Any member or associate who resigns or is dropped under the provisions of Sections 1 and 2 of this article ceases to have any rights in the Association and ceases to incur further indebtedness to the Association.

SECTION 4. Any person who has ceased to be a member or associate under Section 1 or Section 2 of this article may be reinstated by unanimous vote of the executive committee subject to the payment of any outstanding dues and obligations which were incurred, prior to the date when he ceased to be a member or associate of the Association.

In the case of any member or associate who has been dropped between the dates of January 1, 1931, and January 1, 1936, for non-payment of dues and who shall apply for reinstatement, the executive committee is authorized, at its discretion, to accept the resignation of such member or associate effective at any date during such period of delinquency, provided, the member shall pay all indebtedness to the Association incurred prior to the date of such resignation including a proper proportion of annual dues as shall be fixed by the executive committee. Such member or associate shall not be entitled to receive the *Bulletin* for any period subsequent to the date when his resignation became effective and prior to his reinstatement.

SECTION 5. Charges of misconduct in violation of Section 7 of Article III of the constitution shall first be submitted in writing to the president of the Association by a member in good standing, in confidence, with a full statement of the evidence on which the charges are based. If in his judgment they merit further consideration, he shall appoint a committee to consist of three past-presidents of the Association, which shall examine into the charges. If in the judgment of said committee, the facts warrant, it shall prepare and file with the executive committee formal charges against the accused member or associate. As soon as may be after the receipt of such charges the executive committee shall fix a date and place for hearing thereupon, and shall give to the accused person notice thereof in writing, mailed to him by registered mail at his last-known post-office address not less than thirty (30) days before said date, accompanied by a copy of the charges, and a copy of this article.

SECTION 6. On the day fixed for the hearing, the accused person may appear before the executive committee, either in person or by an accredited representative; hear any witnesses who may be called in support of the charges; and, at his option, cross-examine the same, and hear any documentary evidence, including a statement from himself in writing. At his option, he may by letter waive personal hearing, and request the executive committee to adjudge the matter on the basis of a written statement of his defense, mailed to the committee before the date set for the hearing. After the conclusion of the hearing, or study of written defense submitted in lieu of a personal hearing, the executive committee shall consider and vote to approve or disapprove the charges. If the executive committee shall, by unanimous vote, declare the charges sustained, it may suspend the accused person from membership for a stated period, admonish him, allow him to resign, or expel him. Failure of the accused person to appear either in person or by an accredited representative shall not prevent the executive committee from proceeding with the trial.

SECTION 7. If the accused person shall not appear at the hearing nor waive his right thereto, and shall within three months after the date set for the hearing file with the executive committee an affidavit stating that he had not received notice of the charges against him in time to enable him to present his defense, the executive committee shall fix a date and place for a hearing not less than thirty days nor more than three months from the receipt of such affidavit, and shall immediately notify the accused person by registered mail of such date and place. Upon the rehearing, the proceedings shall be governed by the provisions of Section 6 of this article.

SECTION 8. Resignation of the accused person from membership in the Association, at any stage of the foregoing prescribed proceedings, shall automatically terminate the proceedings.

SECTION 9. The decision of the executive committee in all matters pertaining to the interpretation and execution of the provisions of Sections 5, 6, and 7 of this article shall be final.

ARTICLE III. PUBLICATIONS

SECTION 1. The proceedings of the annual meeting and the papers presented at such meetings shall be published at the discretion of the executive committee in the Association *Bulletin* or in such other form as the executive committee may decide best meets the needs of the membership of the Association.

SECTION 2. The payment of annual dues for any fiscal year entitles the member or associate to receive without further charge a copy of the *Bulletin* of the Association for that year.

SECTION 3. The executive committee may authorize the printing of special publications to be financed by the Association from its general, publication, or special funds and offered for sale to members and associates in good standing at not less than cost of publication and distribution.

ARTICLE IV. REGIONAL SECTIONS, TECHNICAL DIVISIONS, AND AFFILIATED SOCIETIES

SECTION 1. Regional sections of the Association may be established provided the members of such sections are members of the Association and shall perfect an organization and make application to the executive committee. The executive committee shall submit the application to a vote at a regular annual meeting, an affirmative vote of two-thirds of the members present and voting being necessary for the establishment of such a section; and provided that the Association may revoke the charter of any regional section by a vote of two-thirds of the members present and voting at a regular annual meeting.

SECTION 2. Technical divisions may be established, provided the members interested shall perfect an organization and make application to the executive committee. The executive committee shall submit the application to a vote at a regular meeting, an affirmative vote of two-thirds of the membership present and voting being necessary for the establishment of such a division. In like manner, the Association may dissolve a division by an affirmative vote of two-thirds of the members present and voting at any annual meeting. A technical division may have its own officers, and it may have its own constitution and by-laws provided that, in the opinion of the executive committee, these do not conflict with the constitution and by-laws of the Association. The executive committee shall be emplowered to make arrangements with the officers of the division for the conduct of the business of the division. A division may admit to affiliate membership in the division specially qualified persons who are not eligible to membership in the Association. Technical divisions may affiliate with other scientific societies, with the approval of the executive committee.

SECTION 3. Subject to the affirmative vote of two-thirds of the membership present and voting at an annual meeting, and with legal advice, the executive committee may arrange for the affiliation with the Association of duly organized groups or societies, which by objects, aims, constitutions, by-laws, or practice are developing the study of geology or petroleum technology. In like manner and with like advice, the executive committee may arrange conditions for dissolution of such affiliations. Affiliation with the Association need not prevent affiliation with other scientific societies. Members of affiliated societies who are not members of the Association, shall not have the privilege of advertising their affiliation with the Association on professional cards or otherwise.

ARTICLE V. DISTRICT REPRESENTATIVES

The executive committee shall cause to be elected district representatives from districts which it shall define by a local geographic grouping of the membership. Such districts shall be redesignated and redefined by the executive committee as often as seems advisable. Each district shall be entitled to one representative for each seventy-five members, but this shall not deprive any designated district of at least one representative. The representatives so apportioned shall be chosen from the membership of the district by a written ballot arranged by the executive committee. They shall hold office for two years, their term of office expiring at the close of the annual meeting.

ARTICLE VI. COMMITTEES

Appointment and Tenure

SECTION 1. There shall be the following standing committees: business committee; research committee; committee on geologic names and correlations; committee on applications of geology; committee for publication; finance committee; committee on statistics of exploratory drilling; trustees of revolving publication fund; trustees of research fund; medal award committee; and distinguished lecture committee.

The president shall appoint all standing committees except the business committee and the medal award committee, for which provision is hereafter made. Members of all committees except the business committee shall serve for a three-year term, but in rotation, with one-third of the members being appointed each year. The president shall designate the chairmen, annually, shall have power to fill vacancies, and shall notify the members of the committees of their appointment. The president may designate one or more vice-chairmen annually.

In addition to the aforesaid standing committees, the executive committee shall appoint annually a nominating committee and its chairman, the president shall appoint annually a ballot committee, and annually or semiannually a resolutions committee, and such special committees as the executive committee may authorize. Special committees shall be appointed for a term of one year. The president shall designate the chairmen of such committees.

Business Committee

SECTION 2. The business committee shall act as a council and advisory board to the executive committee and the Association. This committee shall consist of the executive committee, not more than five members at large appointed annually by the president, two members elected by and from each technical division, and the district representatives. The president shall also appoint annually a chairman and a vice-chairman, but neither of these need be one of those otherwise constituting the business committee. The secretary-treasurer shall act as secretary of the business committee. If a district or technical representative is unable to be present at any meeting of the committee he may designate an alternate, who, in the case of a district representative, may or may not be a resident of the district he is asked to represent, and the alternate, on presentation of such a designation in writing, shall have the same powers and privileges as a regularly chosen representative. The business committee shall meet the day before the annual meeting at which all proposed changes in the constitution or by-laws shall be considered, all old and new business shall be discussed, and recommendations shall be voted for presentation at the annual meeting.

Research Committee

SECTION 3. The purpose of the research committee is the advancement of research, particularly within the field of petroleum geology. The committee shall consist of twenty-four members unless a different number is authorized by the executive committee.

Committee on Geologic Names and Correlations

SECTION 4. The purpose of the committee on geologic names and correlations is to lend assistance to authors on problems on stratigraphy and nomenclature and to advise the editor and executive committee in regard to the propriety of the use of stratigraphic names and correlations in papers submitted for publication by the Association. The committee shall consist of fifteen members unless a different number is authorized by the executive committee.

Committee on Applications of Geology

SECTION 5. The object of the committee on applications of geology is to advise and promote ways and means for informing the general public on all phases of geology particularly on the natural occurrence of oil and gas underground, the methods of searching for these substances, and the methods of exploiting them. The committee shall consist of twelve members unless a different number is authorized by the executive committee.

Committee for Publication

SECTION 6. The purpose of the committee for publication is to assist in securing desirable manuscripts for publication in the *Bulletin* or other publications of the Association. The committee may also assist in securing papers for delivery at the annual meetings. The committee shall consist of twenty-four members unless a different number is authorized by the executive committee.

Finance Committee

SECTION 7. The finance committee shall act as financial advisers to the executive committee. The committee shall consist of three members. If a member of the finance committee should be elected to the executive committee he shall resign from the finance committee and the president shall appoint a member of the Association to complete his unexpired term

Trustees of Revolving Publication Fund

SECTION 8. Before any publication project shall be undertaken with the use of the revolving publication fund the approval of the trustees and the executive committee must be secured. There shall be three trustees. If a trustee should be elected to the executive committee he shall resign as a trustee and the president shall appoint a member of the Association to complete his unexpired term.

Trustees of Research Fund

SECTION 9. Before any research work may be undertaken with the use of money from the research fund, the approval of the trustees and the executive committee shall be secured. There shall be three trustees. If a trustee shall be elected to the executive committee he shall resign as a trustee and the president shall appoint a member of the Association to complete his unexpired term.

Resolutions Committee

SECTION 10. The resolutions committee shall be charged with the duty of presenting at the annual and semi-annual meetings resolutions expressing the Association's appreciation and thanks to those who have worked and contributed to the success of the meetings.

Medal Award Committee

SECTION 11. The purpose of the committee shall be to choose recipients for all medals or other awards which may be established by the executive committee. The committee shall consist of nine members and three ex-officio members. The nine members of the original committee shall be appointed by the president, three of whom shall serve for three years, three for two years, and three for one year. One of each of the groups appointed for the different lengths of time shall be a former president of the Association. Each incoming president shall thereafter appoint three members of the committee to serve for three years, one of which shall be a former president of the Association. Vacancies on the committee due to resignation or other causes shall be immediately filled by the president. The ex-officio members shall be: (1) the president of the Association, (2) the president of the Society of Exploration Geophysicists, (3) the president of the Society of Economic Paleontologists and Mineralogists. The president of the Association shall be the chairman of the committee, unless he shall, at his election, name a chairman to serve for one year.

Committee on Statistics of Exploratory Drilling

SECTION 12. The function of the committee on statistics of exploratory drilling shall be to assemble and compile statistics on the methods used to locate exploratory wells and

on the results of exploratory drilling for oil and gas, and annually to submit for publication in the *Bulletin* a report summarizing and analyzing these data. This committee shall consist of twenty-four members unless a different number is authorized by the executive committee.

Distinguished Lecture Committee

SECTION 13. The purpose of the distinguished lecture committee is to arrange, conduct, and manage a series of self-sustaining, non-profit lecture tours among affiliated societies and Association sections by outstanding speakers on timely subjects. The committee shall consist of seven members unless a different number is authorized by the executive committee.

Nominating Committee

SECTION 14. The purpose of the nominating committee is to nominate candidates for the Association offices as provided in the constitution. The committee shall consist of a chairman and four other members appointed by the executive committee to serve one year. At least two members of the nominating committees shall be past officers of the Association.

Ballot Committee

SECTION 15. The function of the ballot committee is to count the ballots received in the regular annual election and to report the final results to the president. A preferential form of ballot shall be counted in the following manner. The ballot committee shall count first-choice votes only. If no candidate receives a majority, the candidate with the fewest votes shall be eliminated and the second choice on his ballots shall be counted as first choice for the remaining candidates. The committee shall continue this procedure until one candidate has a majority.

ARTICLE VII. AMENDMENTS

These by-laws may be amended by vote of three-fourths of the members present and voting at any annual meeting, provided that such changes shall have been recommended to the meeting by the business committee and provided that their legality shall be determined by the executive committee prior to publication.

PROFESSIONAL DIRECTORY

CALIFORNIA

PAUL P. GOUDKOFF
Geologist
Geologic Correlation by Foraminifera and Mineral Grains
799 Subway Terminal Building
LOS ANGELES, CALIFORNIA

LUIS E. KEMNITZER
KEMNITZER, RICHARDS AND DIEPENBROCK
Geologists and Petroleum Engineers
1003 Financial Center Building
704 South Spring Street
LOS ANGELES 14, CALIFORNIA

A. I. LEVORSEN
Petroleum Geologist
STANFORD UNIVERSITY CALIFORNIA

ERNEST K. PARKS
Consultant in
Petroleum and Natural Gas Development
and
Engineering Management
614 S. Hope St.
LOS ANGELES, CALIFORNIA

RICHARD L. TRIPLETT
Core Drilling Contractor
PArkway 9925 1660 Virginia Road
LOS ANGELES 6, CALIF.

EVERETT C. EDWARDS
Geologist
Telephone 1332 501 South Coast Boulevard
Laguna Beach, California

HAROLD W. HOOTS
Geologist
555 South Flower
LOS ANGELES 13 CALIFORNIA

VERNON L. KING
Petroleum Geologist and Engineer
707 South Hill Street
LOS ANGELES, CALIFORNIA
Vandike 7087

JEROME J. O'BRIEN
Petroleum Geologist
Examinations, Reports, Appraisals
Petroleum Building
714 West Olympic Boulevard
MCCARTHY & O'BRIEN Los Angeles 15, Calif.

HENRY SALVATORI
Western Geophysical Company
711 Edison Building
601 West Fifth Street
LOS ANGELES, CALIFORNIA

COLORADO

C. A. HEILAND
Heiland Research Corporation
130 East Fifth Avenue
DENVER 9, COLORADO

HARRY W. OBORNE
Geologist
620 East Fontanero Street
Colorado Springs, Colorado
Main 4711

COLORADO

EVERETT S. SHAW
Geologist and Engineer
3141 Zenobia Street
DENVER 12 COLORADO

V. ZAY SMITH L. BRUNDALL
R. McMILLAN A. R. WASEM
Geophoto Services
Photogeologists and Consulting Geologists
305 E & C Building DENVER 2, COLO.

ILLINOIS

C. E. BREHM
Consulting Geologist
and Geophysicist
New Stumpp Building, Mt. Vernon, Illinois

J. L. McMANAMY
Consulting Geologist
Mt. Vernon, Illinois

L. A. MYLIUS
Geologist Engineer
122A North Locust Street
Box 264, Centralia, Illinois

T. E. WALL
Geologist
Mt. Vernon Illinois

INDIANA

HARRY H. NOWLAN
Consulting Geologist and Engineer
Specializing in Valuations
Evansville 19, Indiana
317 Court Bldg. Phone 2-7818

KANSAS

C. ENGSTRAND J. D. DAVIES
Detailed Lithologic Logs
KANSAS SAMPLE LOG SERVICE
415 N. Pershing
Wichita Kansas

KANSAS

WENDELL S. JOHNS
PETROLEUM
GEOLOGIST
Office Phone 3-1540 600 Bitting Building
Res. Phone 2-7266 Wichita 2, Kansas

EDWARD A. KOESTER
Petroleum Geologist
302 Orpheum Bldg., Wichita, Kansas

LOUISIANA

GORDON ATWATER
Consulting Geologist
Whitney Building
New Orleans Louisiana

WILLIAM M. BARRET, INC.
Consulting Geophysicists
Specializing in Magnetic Surveys
Giddens-Lane Building SHREVEPORT, LA.

LOUISIANA

G. FREDERICK SHEPHERD
Consulting Geologist
123 Maryland Drive
Phone AUdubon 1403 New Orleans 18, La.

MEXICO

C. E. BURBRIDGE, JR.
Petroleum Mining
Estación Wadley, S.L.P., Mexico
Phone: Mexican No. 1—Telegraph: Estación
Wadley, via Estación Catorce, S.L.P.

MISSISSIPPI

R. Merrill Harris Willard M. Payne

HARRIS & PAYNE

Geologists

100 East Pearl Bldg. Phone 4-6286
Jackson, Miss. or L. D. 89

MISSISSIPPI

E. T. MONSOUR

Consulting Geologist

P.O. Box 2571
West Jackson Station
Jackson, Mississippi

112½ E. Capitol St. Phone 2-1368

NEW MEXICO

VILAS P. SHELDON

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Geological Reports, Valuations, Appraisals, Microscopic well cutting examination, well completion supervision, reservoir performance analyses

Office Phone 720-W Carper Building
Home Phone 702-J Artesia, New Mexico

FREDERICK F. MELLEN

Consulting Geologist

P.O. Box 2584
West Jackson Station
Jackson, Mississippi

113½ W. Capitol Street Phone 54541

MONTANA

HERBERT D. HADLEY

Petroleum Geologist

Billings, Montana

801 Grand Ave. Phone 2950

NEW YORK

BROKAW, DIXON & McKEE

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New York Houston

NEW YORK

FRANK RIEBER

Geophysicist

Specializing in the development of new instruments and procedures

127 East 73d St. New York 21

BASIL B. ZAVOICO

Petroleum Geologist and Engineer

220 E. 42nd St. City National Bank Bldg.
New York 17, N.Y. Houston, Texas
MUrray Hill 7-7591 Charter 4-6923

NORTH CAROLINA

RODERICK A. STAMEY

Petroleum Geologist

109 East Gordon Street
KINGSTON NORTH CAROLINA

OHIO

JOHN L. RICH

Geologist

General Petroleum Geology
Geological Interpretation of Aerial Photographs

University of Cincinnati
Cincinnati, Ohio

OHIO

GORDON RITTENHOUSE

Geologist

Specializing in sedimentation and Sedimentary petrology

University of Cincinnati
Cincinnati 21, Ohio

OKLAHOMA

ELFRED BECK

Geologist

821 Wright Box 55
TULSA, OKLA. DALLAS, TEX.

OKLAHOMA

GARTH W. CAYLOR

Consulting Geologist

206 Chestnut-Smith Building
624 South Cheyenne Avenue
Tel. 2-1783 Tulsa, Oklahoma

CRAIG FERRIS

Geophysicist

E. V. McCollum & Co.
515 Thompson Bldg.
Tulsa 3, Okla.

OKLAHOMA

E. J. HANDLEY
Vice-President
CENTURY GEOPHYSICAL CORPORATION
Phone 5-1171
1333 North Utica Tulsa 6, Okla.

R. W. LAUGHLIN
WELL ELEVATIONS
LAUGHLIN-SIMMONS & Co.
615 Oklahoma Building
TULSA OKLAHOMA

CLARK MILLISON
Petroleum Geologist
Philtower Building
TULSA OKLAHOMA

HUGH C. SCHAEFFER
Geologist and Geophysicist
Schaeffer Geophysical Company
National Bank of Tulsa Building
TULSA, OKLAHOMA

WARE & KAPNER
SAMPLE LOG SERVICE
Wildcat Sample Log Service
Covering Southern Oklahoma
John M. Ware H. H. Kapner
Tulsa, Oklahoma
332 East 29th Place 4-2539

ROBERT R. WHEELER
Consulting Geologist
Tekton Oil Co., Inc.
Specializing in Anadarko Basin
Possibilities and Prospects
Phone 7-1142
12th Floor, Petroleum Bldg. Oklahoma City

WALTER E. HOPPER
Geologist and Consultant
Petroleum and Natural Gas
Reports Appraisals
Estimates of Reserves
510 National Mutual Building Tulsa 3, Oklahoma

FRANK A. MELTON
Consulting Geologist
Aerial Photographs
and Their Structural Interpretation
1010 Chautauqua Norman, Oklahoma

P. B. NICHOLS H. T. BROWN
Mechanical Well Logging
THE GEOLOGRAPH COMPANY, INC.
27 N.E. 27
Phone 58-5511 P.O. Box 1291
Oklahoma City 1, Oklahoma

JOSEPH A. SHARPE
Geophysicist
FROST GEOPHYSICAL CORPORATION
4408 South Peoria Ave. Tulsa 3, Okla.

G. H. WESTBY
Geologist and Geophysicist
Seismograph Service Corporation
Kennedy Building Tulsa, Oklahoma

PENNSYLVANIA

HUNTLEY & HUNTLEY
Petroleum Geologists
and Engineers
Grant Building, Pittsburgh, Pa.
L. G. HUNTLEY
J. R. WYLIE, JR.
JAMES F. SWAIN

TEXAS

JOSEPH L. ADLER
Geologist and Geophysicist
Contracting Geophysical Surveys
in Latin America
Independent Exploration Company
Esperson Building Houston, Texas

CHESTER F. BARNES
Geologist and Geophysicist
Petroleum Bldg. P.O. Box 266, Big Spring, Tex.

TEXAS

BRYAN D. BECK, JR.
Petroleum Consultant
Geology Engineering Micropaleontology
Drilling Blocks—Farmouts
Well Promotions—Production
222 Orleans Street Beaumont, Texas

JOHN L. BIBLE
Consulting Geophysicist
TIDELANDS EXPLORATION COMPANY
Gravity Surveys on Land and Water
2626 Westheimer
Houston 6, Texas

HART BROWN
BROWN GEOPHYSICAL COMPANY
Gravity
P.O. Box 6005 Houston 6, Texas

R. W. BYRAM
R. W. BYRAM & COMPANY
Geologists and Petroleum Engineers
Texas Oil and Gas Statistics Austin, Texas

D'ARCY M. CASHIN
Geologist *Engineer*
Specialist Gulf Coast Salt Domes
Examinations, Reports, Appraisals
Estimates of Reserves
705 Nat'l Standard Bldg.
HOUSTON, TEXAS

CUMMINS, BERGER & PISHNY
Consulting Engineers & Geologists
Specializing in Valuations
1603 Commercial Standard Bldg.
Fort Worth 2, Texas
Ralph H. Cummins
Walter R. Berger
Chas. H. Pishny

E. DEGOLYER
Geologist
Esperson Building
Houston, Texas
Continental Building
Dallas, Texas

R. L. BECKELHYMER
Consulting Geologist
Domestic and Foreign Experience
307 Rusk Building Houston 2, Texas

IRA A. BRINKERHOFF
Geologist
Associated with
CUMMINS, BERGER & PISHNY
730 Bankers Mortgage Building
Houston, Texas

E. O. BUCK
Geologist and Petroleum Engineer
NATIONAL BANK OF COMMERCE
GULF BUILDING, HOUSTON, TEXAS

GEORGE W. CARR
Carr Geophysical Company
Commerce Building Houston, Texas

PAUL CHARRIN
Geologist and Geophysicist
UNIVERSAL EXPLORATION COMPANY
2044 Richmond Road, Houston 6, Texas
913 Union National Bank Building
Houston 2, Texas

R. H. DANA
Southern Geophysical Company
Sinclair Building
FORT WORTH, TEXAS

ALEXANDER DEUSSEN
Consulting Geologist
Specialist, Gulf Coast Salt Domes
1006 Shell Building
HOUSTON, TEXAS

TEXAS

DAVID DONOGHUE
Consulting Geologist
Appraisals - Evidence - Statistics
Fort Worth National Bank Building — FORT WORTH, TEXAS

RALPH H. FASH
Consulting Chemist
Chemistry applied to the search for oil
1811 W. T. Waggoner Bldg.
Fort Worth 2, Texas
Telephones:
Office 3-7351
Res. 5-3852

JOHN A. GILLIN
National Geophysical Company
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Regular Meetings: 7:30 P.M., Geological Room, University of Wichita, first Tuesday of each month. Noon luncheons, first and third Monday of each month at Wolf's Cafeteria. The Society sponsors the Kansas Well Log Bureau, 412 Union National Bank Building, and the Kansas Well Sample Bureau, 137 North Topeka. Visiting geologists and friends welcome.

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Union Producing Company, Box 1628

Meets the first Monday of every month October-May, inclusive, 7:30 P.M., St. Charles Hotel. Special meetings by announcement. Visiting geologists cordially invited.

LOUISIANA

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Stanolind Oil and Gas Company, Box 1092

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Meetings: Dinner and business meetings third Tuesday of each month at 7:00 P.M. at the Majestic Hotel. Special meetings by announcement. Visiting geologists are welcome.

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Capitol Savings and Loan Bldg., Lansing
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Sohio Petroleum Company, Mt. Pleasant

Meetings: Monthly, November through May, at Michigan State College, East Lansing, Michigan. Informal dinners at 6:30 P.M., followed by discussions. Visiting geologists are welcome.

MISSISSIPPI

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Secretary-Treasurer - - - - - E. T. Monsoor
Consultant, Box 2571, West Jackson

Meetings: First and third Thursdays of each month, from October to May, inclusive, at 7:30 P.M., The Creole Room, LeFleur's Restaurant, Jackson, Mississippi. Visiting geologists welcome to all meetings.

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Secretary-Treasurer - - - - - Frank Millard
Schlumberger Well Surveying Corp., Box 747

Dinner meetings will be held at 7:00 P.M. on the first Wednesday of every month from October to May, inclusive, at the Ardmore Hotel.

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Tide Water Associated Oil Company,
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Phillips Petroleum Company

Meetings: Technical program each month, subject to call by Program Committee, Oklahoma City University, 24th Street and Blackwelder. Luncheons: Every second and fourth Thursday of each month, at 12:00 noon, Y.W.C.A.

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Shawnee

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U. S. Geological Survey
Federal Building

Meetings: First and third Mondays, each month, from October to May, inclusive, at 8:00 P.M., University of Tulsa, Student Union or Tyrrell Hall. Luncheons: Every Friday (October-May), Chamber of Commerce Building.

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111 Haldane Avenue, Pittsburgh 5

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Box 1939

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Regular luncheons, every Thursday, Terrace Annex Room, Robert Driscoll Hotel, 12:00. Special night meetings by announcement.

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Meetings: Monthly luncheons and night meetings by announcement.

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Luncheons: Each week, Monday noon, Blackstone Hotel.
Evening meetings and programs will be announced. Visiting geologists and friends are welcome.

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Box 1410

Secretary-Treasurer - - - Millicent A. Renfro
Texas Pacific Coal and Oil Company, Box 2100

Meetings: Luncheon at noon, Hotel Texas, first and third Mondays of each month. Visiting geologists and friends are invited and welcome at all meetings.

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Regular meeting held the second and fourth Mondays at noon (12 o'clock), Mezzanine floor, Rice Hotel. For any particulars pertaining to the meetings write or call the secretary.

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Meetings: Luncheon 1st and 3d Wednesdays of each month, 12:00 noon, Y.W.C.A. Evening meetings by special announcement. Visiting geologists and friends are cordially invited to all meetings.

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2000 Alamo National Building

Secretary-Treasurer - - - - Maurice E. Forney
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1728 Milam Building

Meetings: One regular meeting each month in San Antonio. Luncheon every Monday noon at Milam Cafeteria, San Antonio.

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Cities Service Oil Company, Box 350

Secretary-Treasurer - - - - Fred S. Alexander
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Meetings: Luncheon 1st and 3rd Wednesdays of each month, 12:00 noon, Herring Hotel. Special night meetings by announcement.

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Secretary - - - - - - - - Clyde W. Turner
Gulf Oil Corporation, Box 1150

Treasurer - - - - - - - - - Jane M. Johnson
Permian Basin Sample Laboratory, Box 1653

Meetings will be announced.

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Editor - - - - - - - - - R. Douglas Rogers
South Penn Natural Gas Company
Union Trust Building, Parkersburg, West Virginia

Meetings: Second Monday, each month, except June, July and August, at 6:30 P.M., Daniel Boone Hotel.

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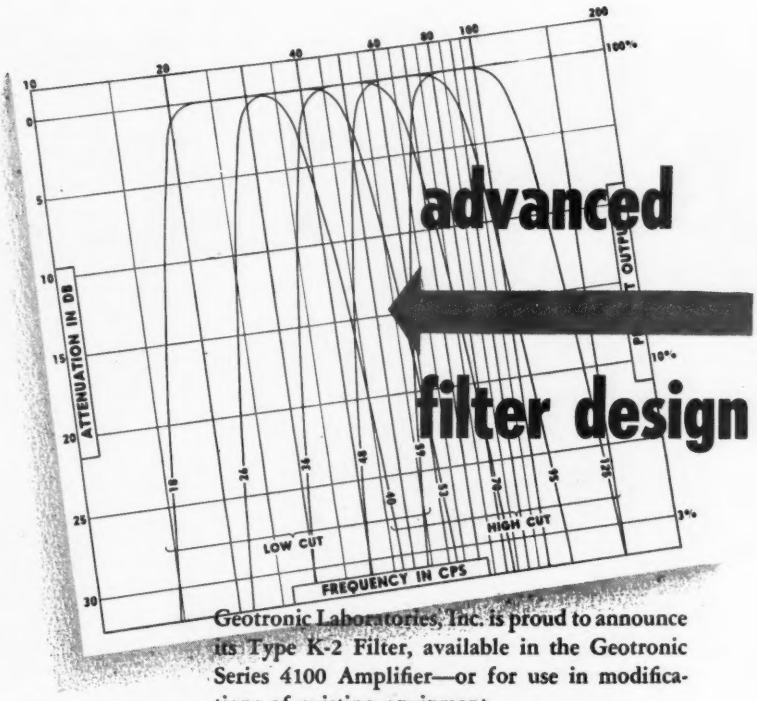

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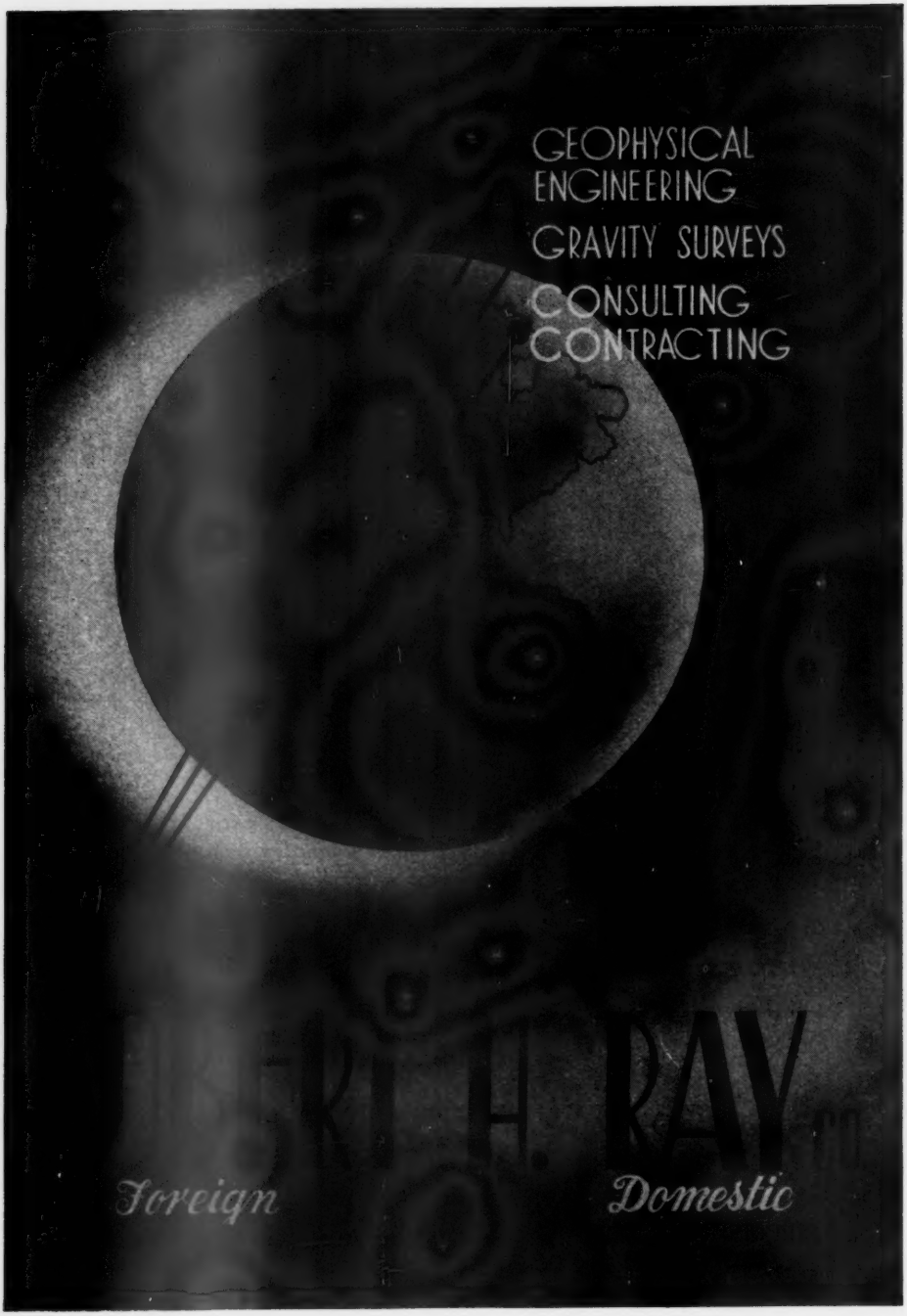
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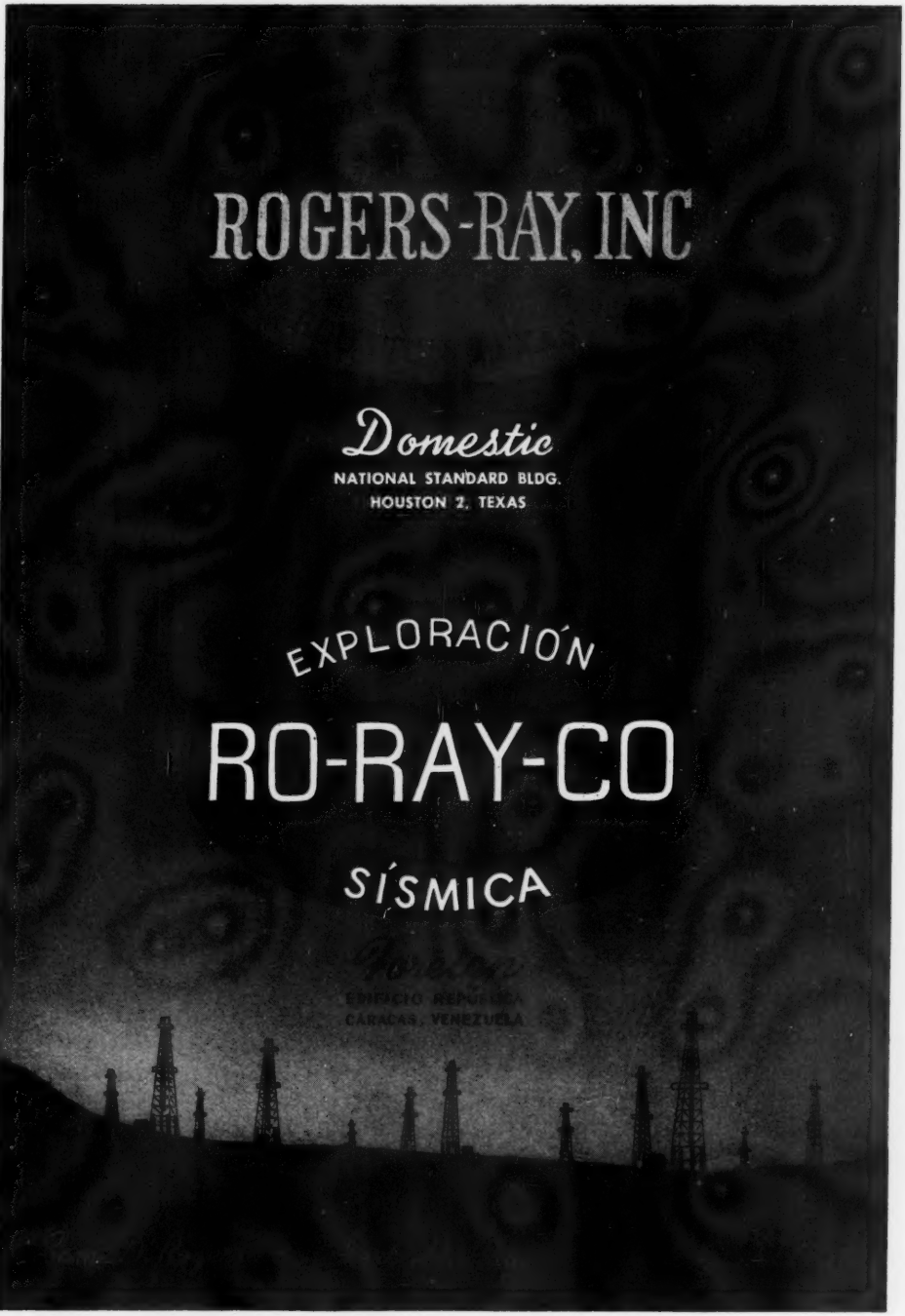
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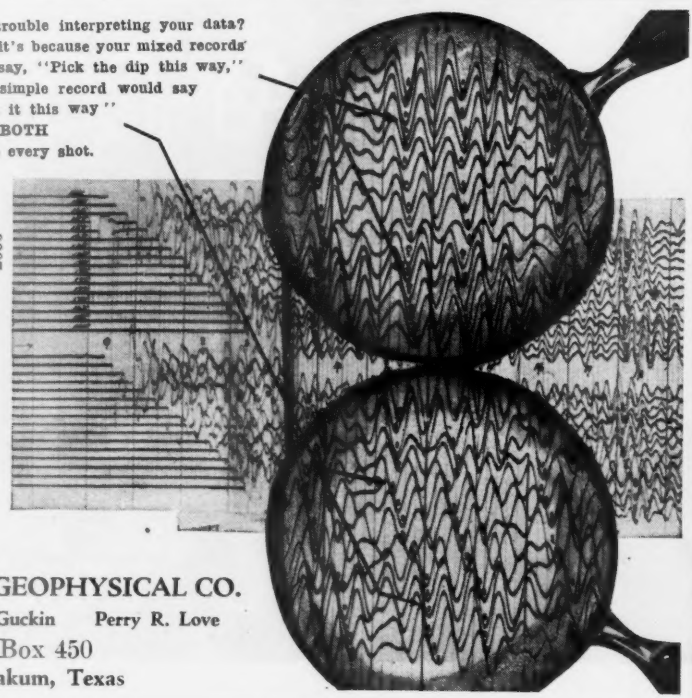

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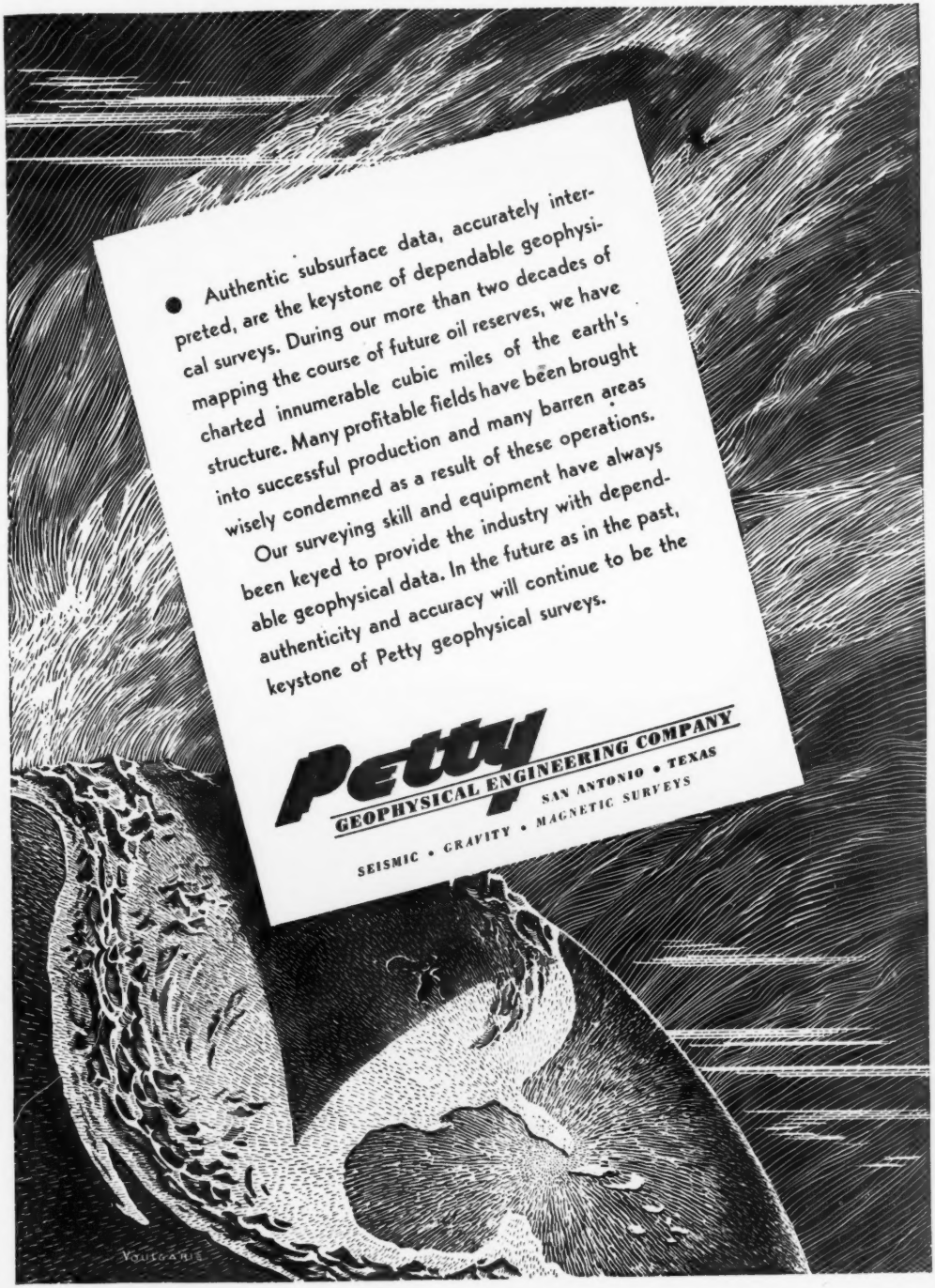
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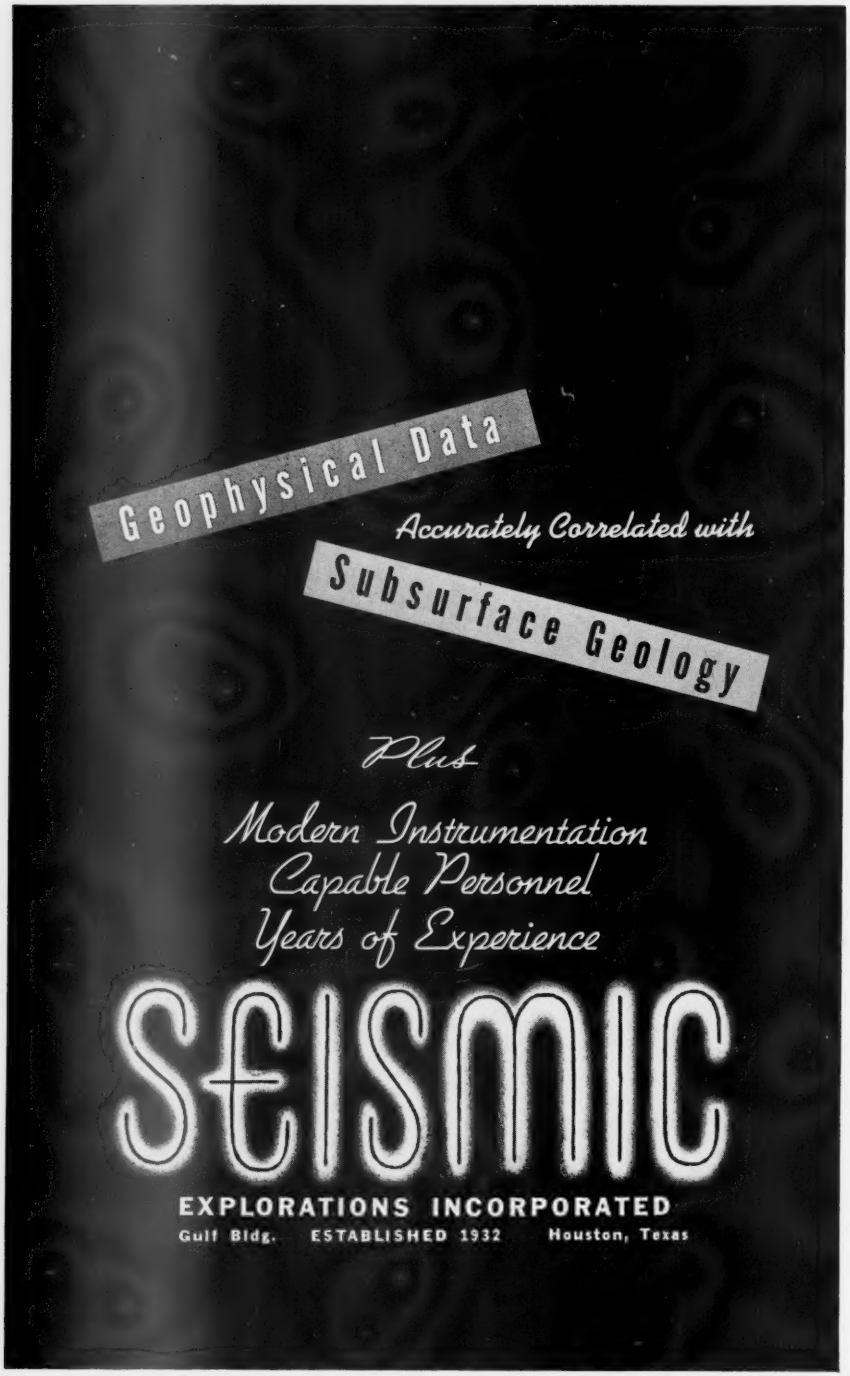
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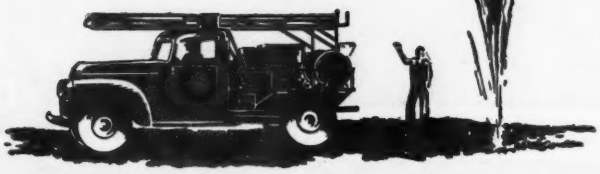

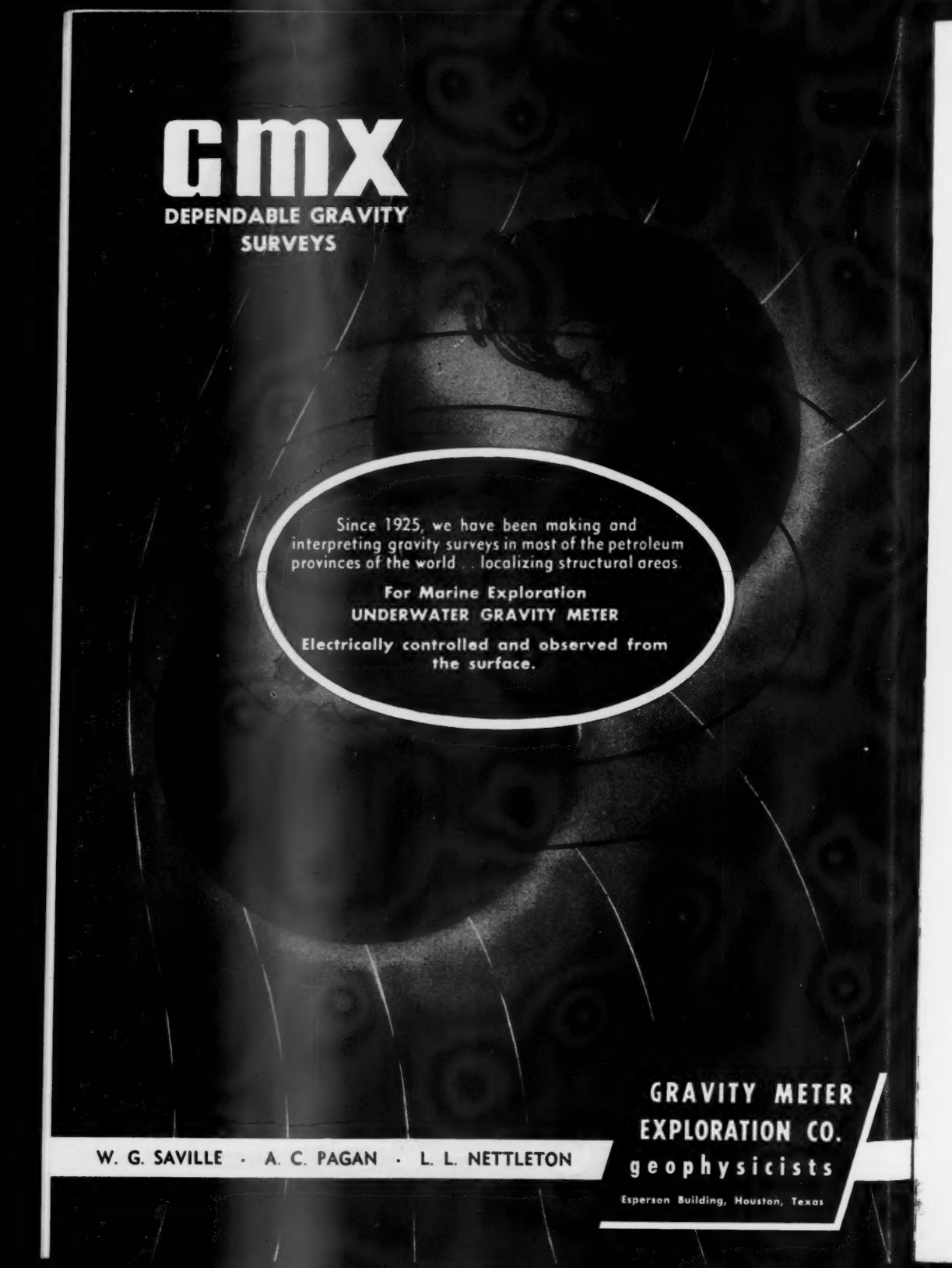
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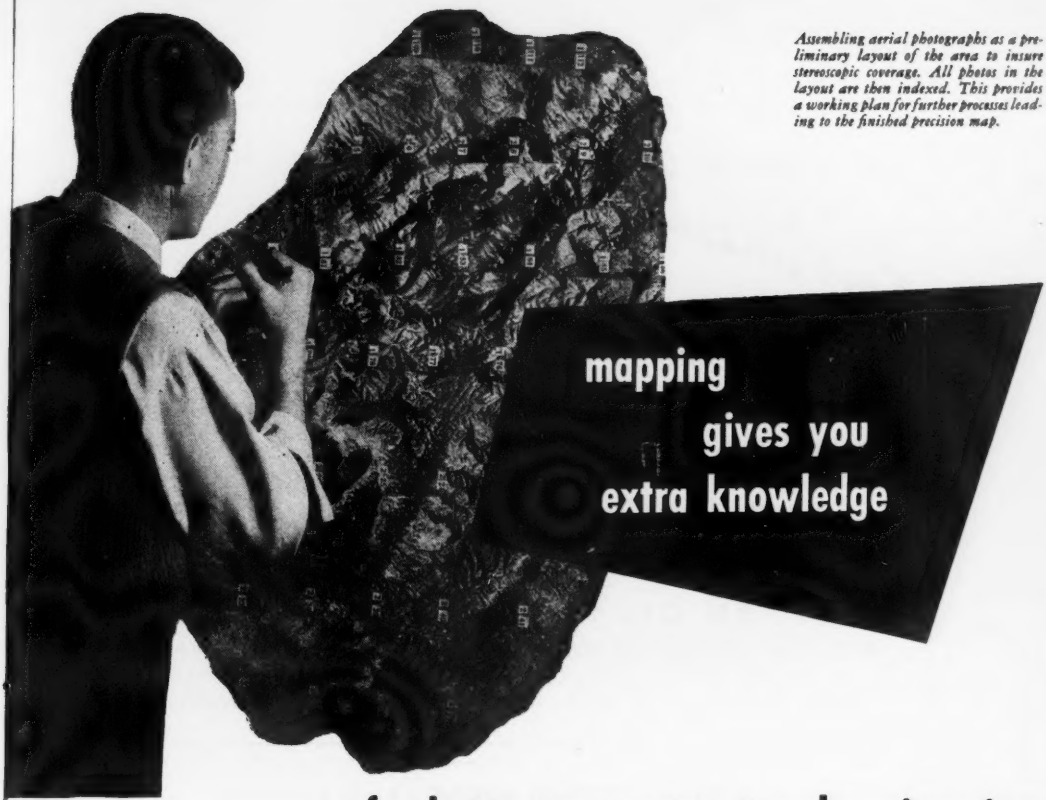

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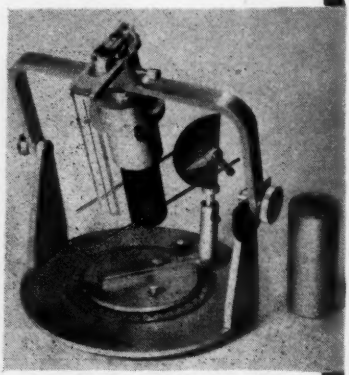

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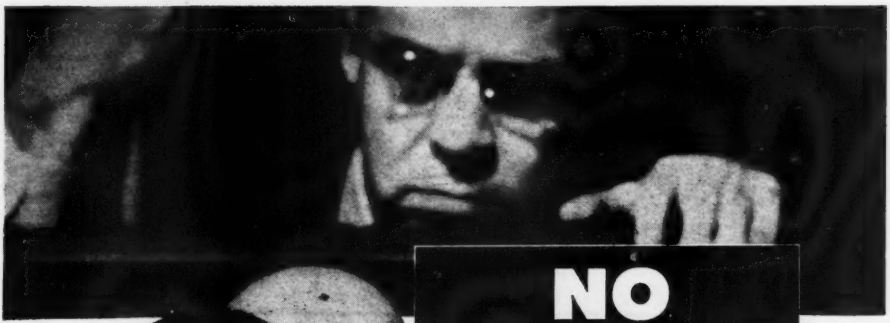

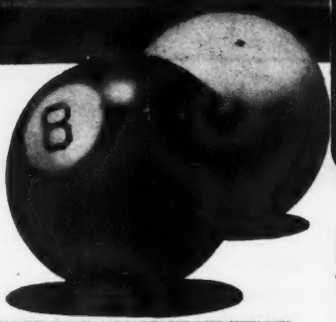

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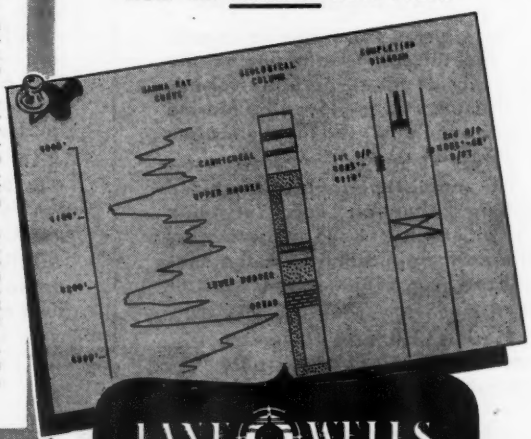

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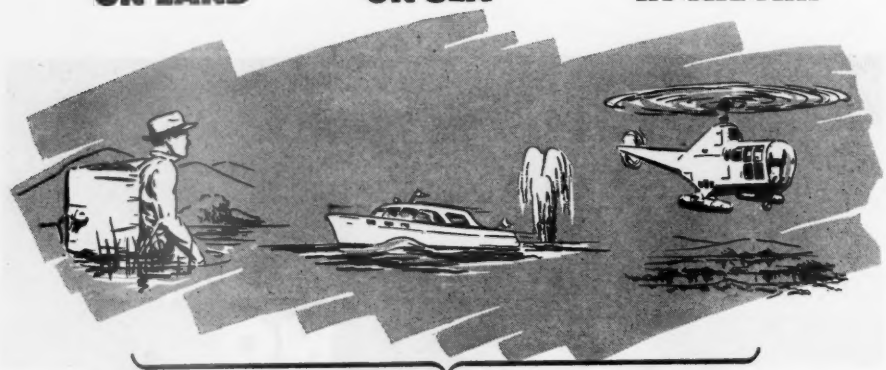

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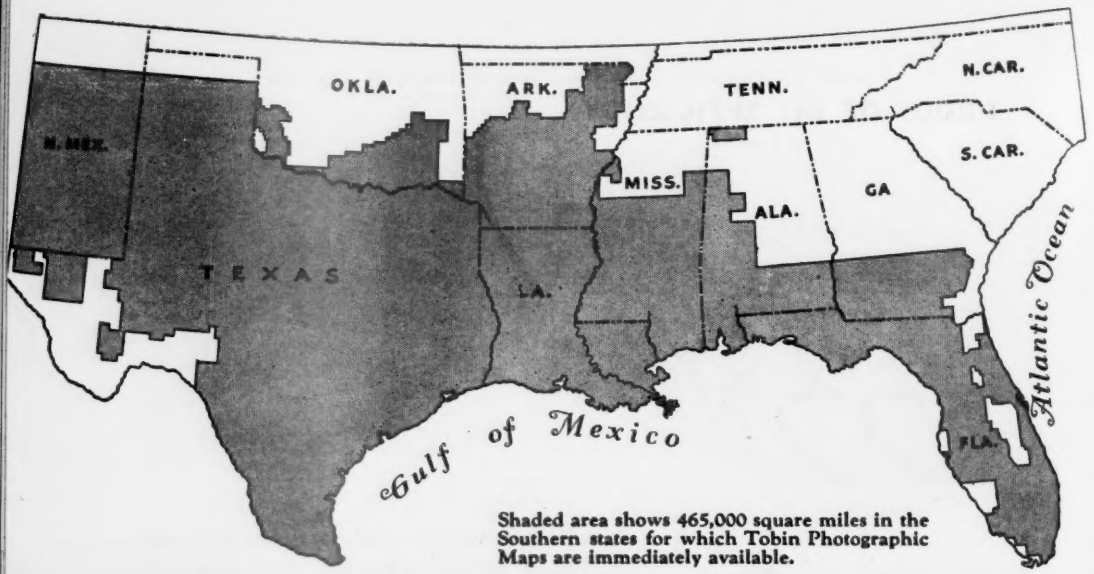

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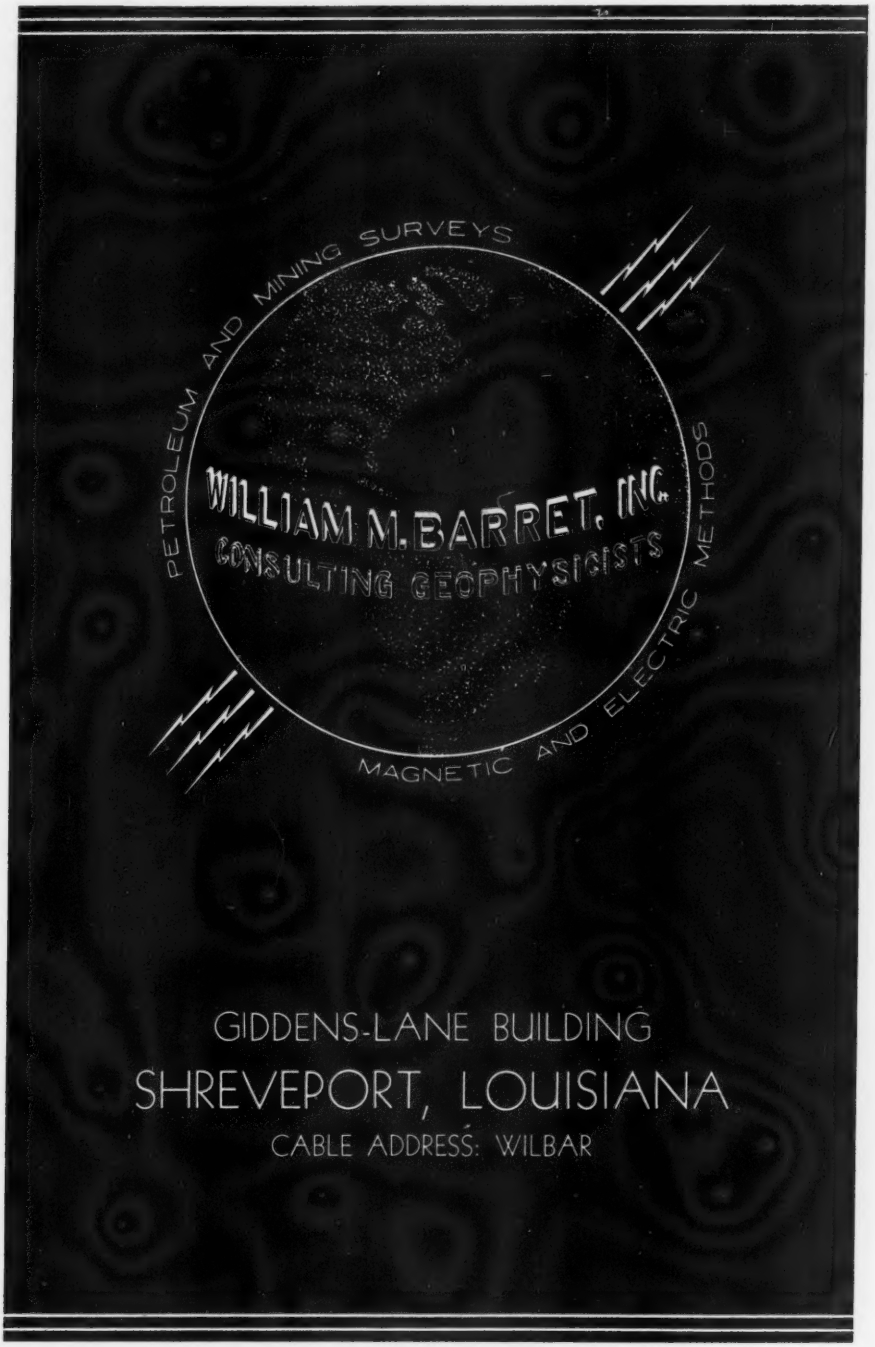
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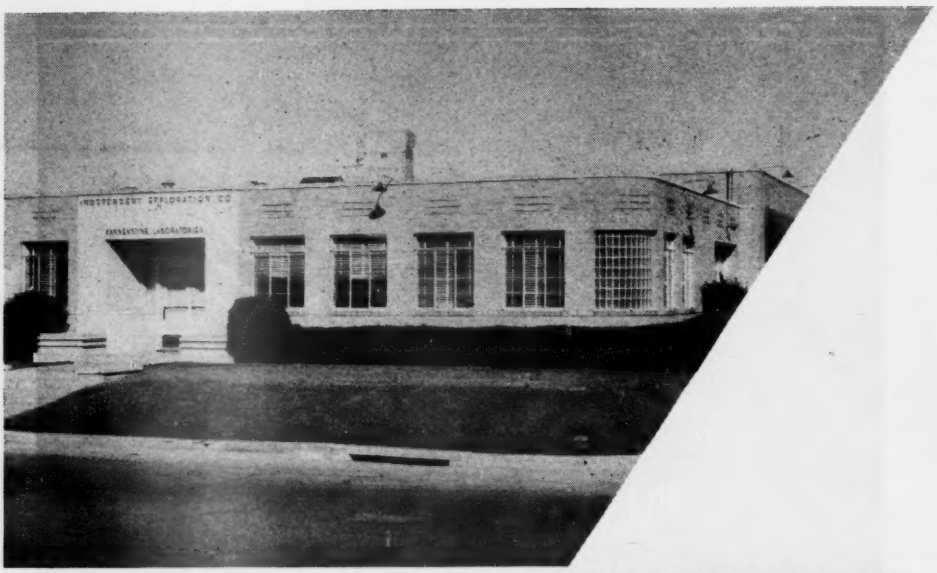

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TOTAL DEPTH	4650'	4680'	4615'	4670'	4681'
CASING DIAMETER	7" @ 4605'	5½" @ 4680'	5½" @ 4570'	7" @ 4624'	5½" @ 4650'
SAND THICKNESS (Net)	36'	27'	35'	32'	24'
CHOKE SIZE	19/64	open 2½" tbg.	1" csg.	open 2½" tbg.	——
PRODUCTION TEST	Flowed 186 bbls. 24 hours	Pumped 75 bbls. 24 hours	Flowed 96 bbls. 24 hours	Flowed 92 bbls. 17 hours	Bailed dry
RESULTS	No swabbing Still flowing	Well now on pump	Production decreasing	Still testing	Flows 20 B/D by heads

Compare this well completed with

BLACK MAGIC

OIL BASE DRILLING FLUID

with these 4 offsets completed with water base muds

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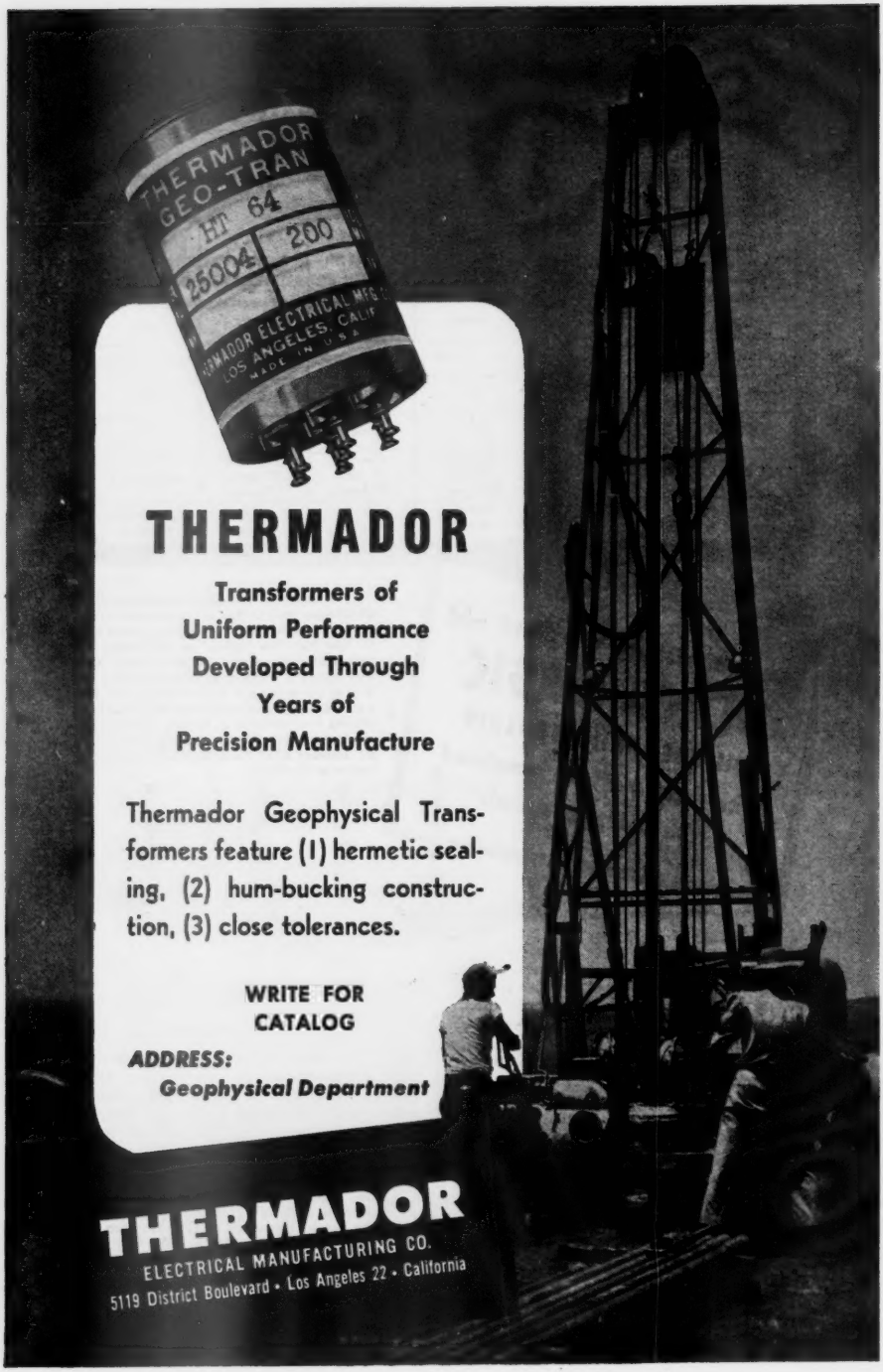
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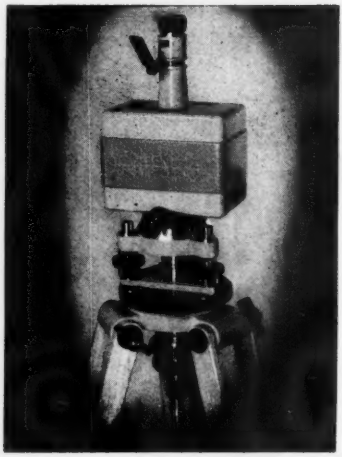

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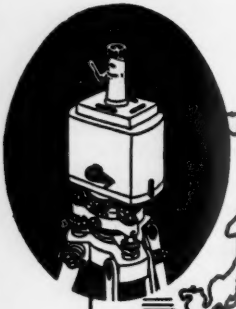

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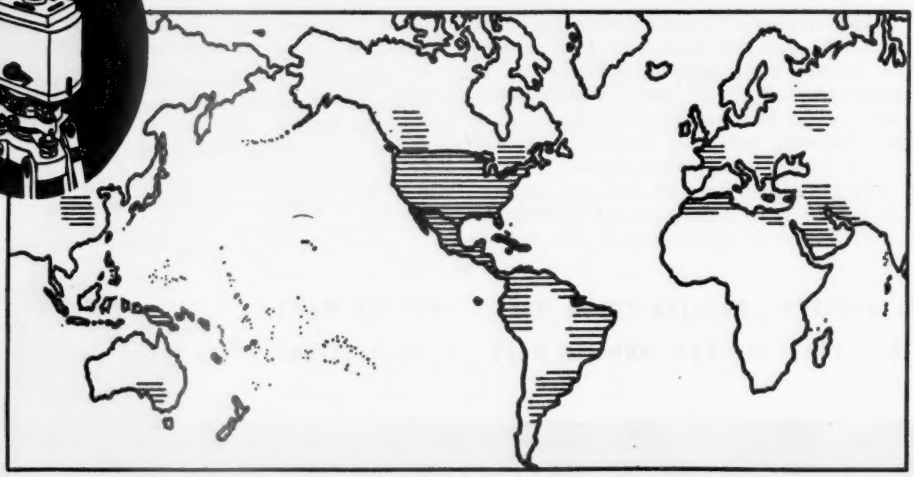

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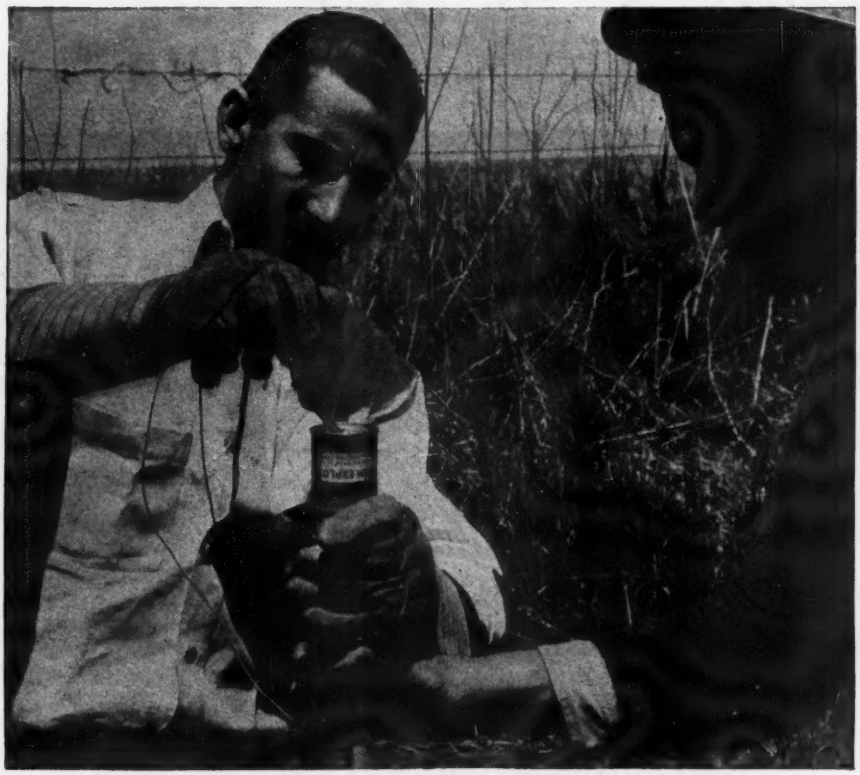

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